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TWENTY-THIRD ANNUAL REPORT

OF THE

Illinois State Beekeepers' Association

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Compiled by
M. G. DADANT,
Hamilton, Illinois

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LETTER OF TRANSMITTAL.

OFFICE OF THE SECRETARY.
HAMILTON, ILLINOIS, *March 15, 1924.*

To His Excellency, Len Small, Governor of the State of Illinois.

SIR: I have the honor to transmit herewith, the Twenty-third Annual Report of the Illinois State Beekeepers' Association.

M. G. DADANT, *Secretary.*

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OFFICERS OF ILLINOIS STATE BEEKEEPERS' ASSOCIATION FOR 1924.

J. R. WOOLDRIDGE . . . . . President
2021 West Seventieth St., Chicago.

A. L. KILDOW . . . . . Inspector of Apiaries
Putnam.

C. H. ROBINSON . . . . . Vice President
Normal.

FRANK BISHOP . . . . . Vice President
Taylorville.

C. H. WILEY . . . . . Vice President
Harrisburg.

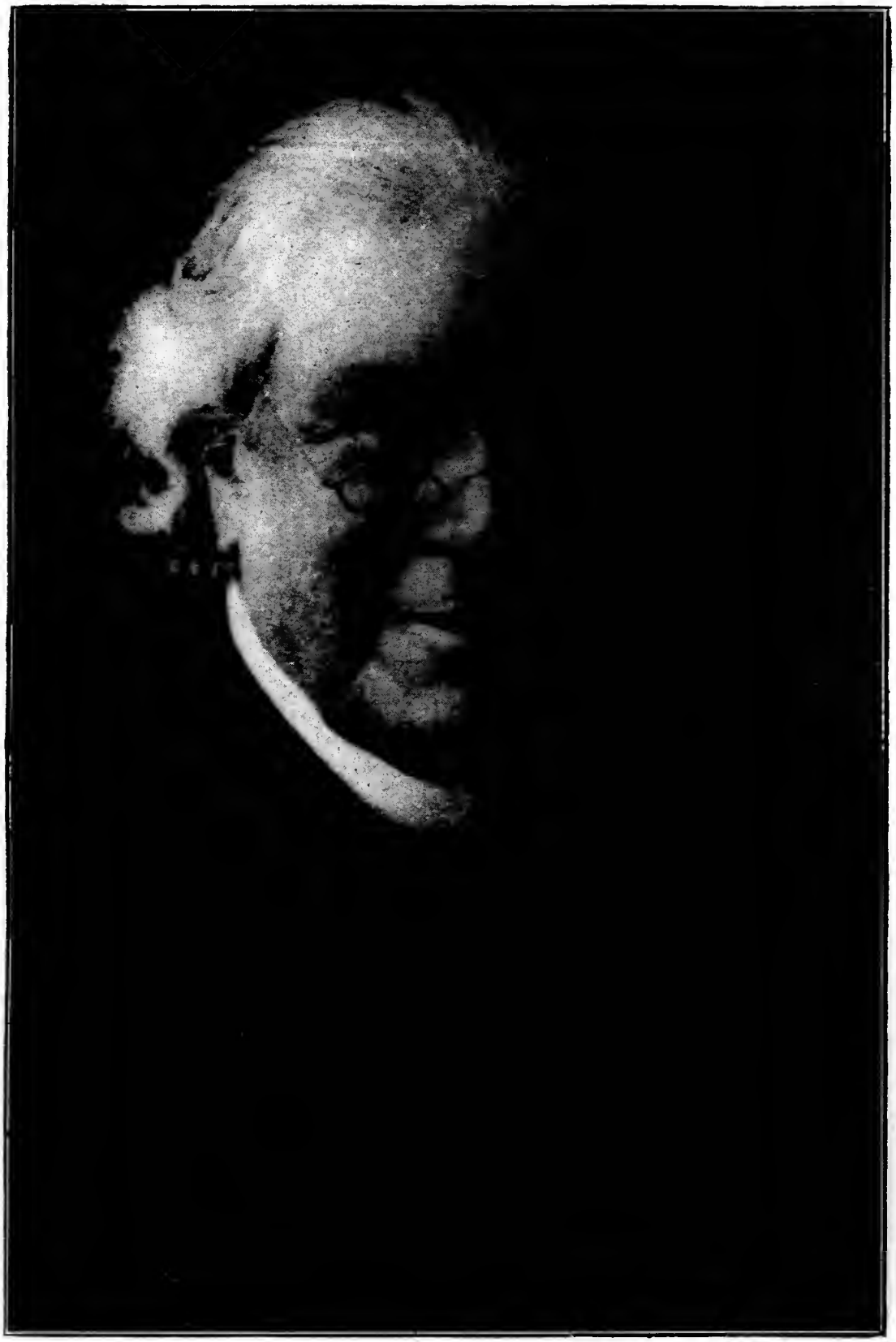
L. R. ALLEN . . . . . Vice President
Carbondale.

W. H. SNYDER . . . . . Vice President
2121 N. Water St., Decatur.

M. G. DADANT . . . . . Secretary
Hamilton.

GEORGE SEASTREAM . . . . . Treasurer
Pawnee.

List of members in back of report. Also index.



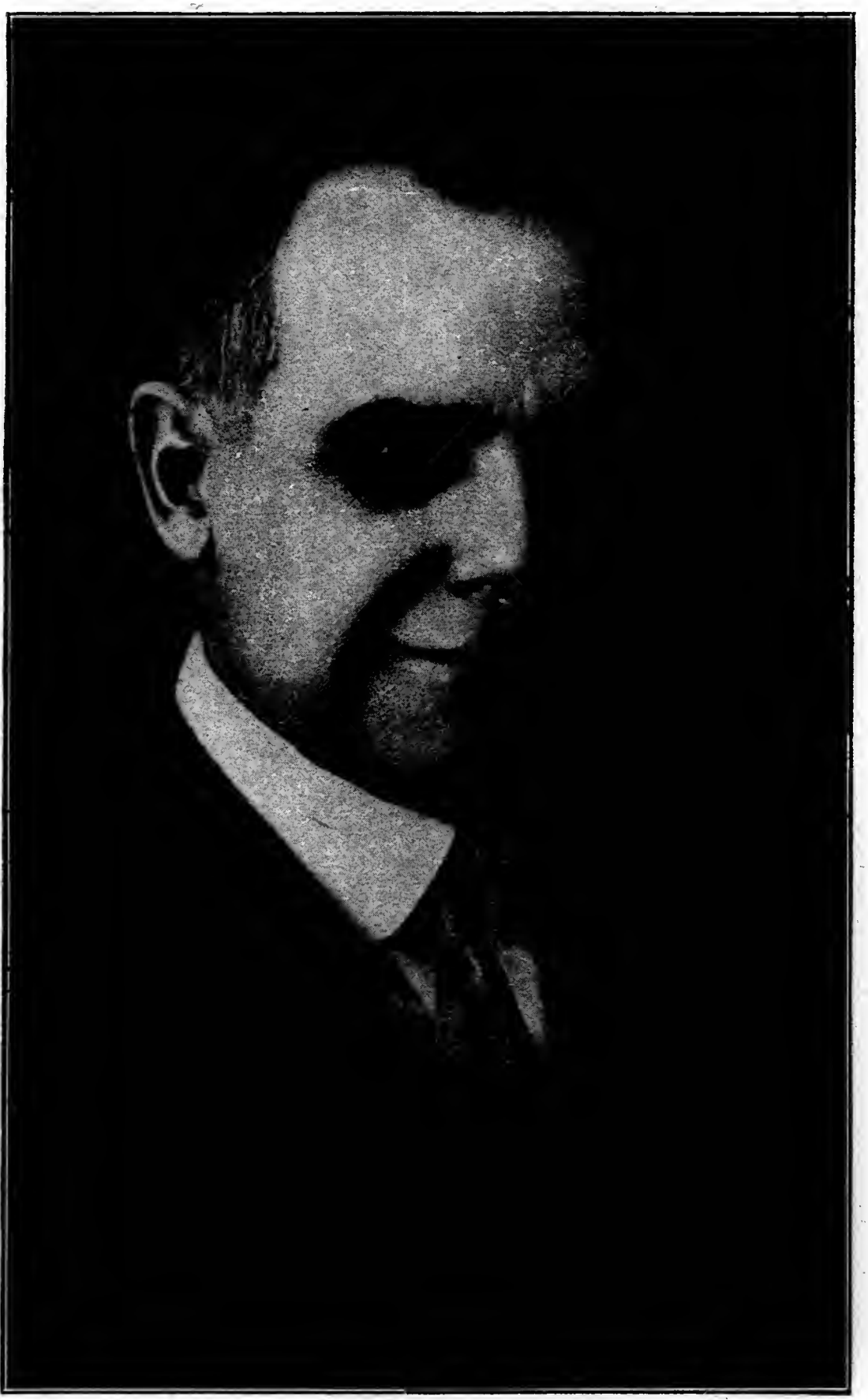
FATHER LANGSTROTH,
1810—1895
Inventor of the Movable Frame Hive.

TWENTY-THIRD ANNUAL REPORT

OF THE

Illinois State Beekeepers' Association

For 1923



J. R. WOOLDRIDGE,
President of the Illinois State Beekeepers' Association.

LIST OF ASSOCIATIONS FOR BEEKEEPING IN THE STATE OF ILLINOIS WITH THEIR OFFICERS.

CHICAGO-NORTHWESTERN BEEKEEPERS' ASSOCIATION.
G. H. CALE, President, Hamilton, Ill.
J. FRANK HAAN, Secretary, Des Plaines, Ill.

CHRISTIAN COUNTY BEEKEEPERS' ASSOCIATION.
FRANK BISHOP, President, Taylorville.
W. H. STUMM, Secretary, Rt. 3, Edinburg.

COLES COUNTY BEEKEEPERS' ASSOCIATION.
CHAS. WALLACE, Secretary, Charleston.

COOK COUNTY BEEKEEPERS' ASSOCIATION.
J. R. WOOLRIDGE, President, 2021 W. 70th St., Chicago.
A. G. GILL, Secretary, 230 W. Huron St., Chicago.

CRAWFORD COUNTY BEEKEEPERS' ASSOCIATION.
HERMAN MCCONNELL, Secretary-Treasurer, Robinson.

FRANKLIN COUNTY BEEKEEPERS' ASSOCIATION.
H. A. DEWERFF, President, Benton.
MATT HOUSE, Secretary-Treasurer, Benton.

HANCOCK COUNTY BEEKEEPERS' ASSOCIATION.
E. J. BAXTER, President, Nauvoo.
J. H. LLOYD, Secretary, Carthage.

HENDERSON COUNTY BEEKEEPERS' ASSOCIATION.
R. R. BANTA, President, Oquawka.
J. LOGUE AKIN, Secretary, Oquawka.

HENRY COUNTY BEEKEEPERS' ASSOCIATION.
ELMER KOMMER, President, Woodhull.
H. H. WILSON, Secretary, Geneseo.

ILLINOIS & INDIANA BEEKEEPERS' ASSOCIATION.
MR. VOIGHT, President, Danville.
C. O'HERRON, Secretary, Rt. 8, Danville.

ILLINOIS VALLEY BEEKEEPERS' ASSOCIATION.
B. F. BELL, President, Kingston Mines.
F. R. ISENBERG, Secretary, Pekin.

JOHNSON COUNTY BEEKEEPERS' ASSOCIATION.
J. G. MCCALL, President, Vienna.
C. W. MILLS, Secretary-Treasurer, Vienna.

Logan County Beekeepers' Association.
S. A. Tyler, President, Emden.
Fred F. Bellatti, Secretary, Mt. Pulaski.

Macon County Beekeepers' Association.
I. C. Evans, President, 1060 W. Marietta St., Decatur.
W. H. Snyder, Secretary, 2121 N. Water St., Decatur.

Madison County Beekeepers' Association.
Earl Waggonner, Secretary, Alton.

Marion County Beekeepers' Association.
J. W. Witchurch, President, 716 S. Cedar, Centralia.
H. A. Wehmer, Secretary, 1136 Dover St., Centralia.

McLean County Beekeepers' Association.
Dr. H. B. Henline, President, Bloomington.
W. B. Brigham, Secretary, 1108 E. Oakland Ave., Bloomington.

Northern Illinois and Southern Wisconsin Beekeepers' Association.
B. Kennedy, Secretary, 416 E. State St., Rockford.

Pope County Beekeepers' Association.
J. E. McCulloch, President, Rt. 2, Golconda.
Mrs. Minnie Daniels, Secretary-Treasurer, Golconda.

Pulaski County Beekeepers' Association.
Wayne Lingenfelter, President, Ullin.
L. E. Lingenfelter, Secretary-Treasurer, Ullin.

Saline County Beekeepers' Association.
C. H. Wiley, President, Harrisburg.
Everett Weaver, Secretary, Rt. 5, Harrisburg.

Southern Illinois Beekeepers' Association.
J. R. Wooldridge, President, 2021 W. 70th St., Chicago.
M. R. Fakes, Secretary-Treasurer, Carbondale.

Union County Beekeepers' Association.
L. S. Foote, President, Anna.
C. F. Kiest, Secretary-Treasurer, Dongola.

Warren County Honey Producers' Association.
Samuel Goodsell, Jr., President, Cameron.
Glen Glass, Secretary, Cameron.

Williamson County Beekeepers' Association.
W. K. Galeener, Farm Adviser, President, Marion.
Otis Kelley, Secretary-Treasurer, Rt. 5, Marion.

Woodford County Beekeepers' Association.
Herbert C. Darnell, President, Eureka.
Benj. H. Fischer, Secretary, Rt. 1, Roanoke.

MINUTES OF THE ANNUAL MEETING ILLINOIS STATE BEEKEEPERS' ASSOCIATION, 1923.

The Annual Meeting of the Illinois State Beekeepers' Association was held at the St. Nicholas Hotel, Springfield, Ill., December 6 and 7, 1923. Reading of minutes 1922 meeting read and approved. After the President's address the reports of the secretary and treasurer and also report of State Inspector of Apiaries, Mr. A. L. Kildow were presented.

Later being so recommended by committee the reports of secretary, treasurer and state inspector were approved and accepted.

Papers were delivered or talks given by the following: Edw. A. Winkler, Geo. E. King, Geo. S. Demuth, J. R. Wooldridge, W. A. Hunter, C. P. Dadant, Prof. Wallace Park, and E. G. LeStourgeon.

The election resulted in the following parties being elected to the various offices for the year 1924. Pres. J. R. Wooldridge, Chicago, Vice Presidents, C. H. Robinson, Normal, Ill., W. H. Snyder, Decatur, Ill., Frank Bishop, Taylorville, Ill., C. H. Wiley, Harrisburg, Ill., L. R. Allen, Carbondale, Ill., Secretary M. G. Dadant, Hamilton, Ill., Treasurer Geo. Seastream, Pawnee, Ill. There being no further business the meeting adjourned to meet at the call of the President in 1924.

Respectfully submitted,

M. G. DADANT, *Secretary.*

MAURICE G. DADANT,
Secretary of the Illinois State Beekeepers' Association.

REPORT OF THE SECRETARY OF THE STATE BEEKEEPERS' ASSOCIATION FOR THE YEAR 1923.

Your Secretary is pleased to report considerable progress in securing members for the year 1923. Our 1922 membership totaled 523 whereas our 1923 membership is exactly 700.

We now have 24 county organizations co-operating with the State Association, their members being taken in at the net rate of 50 cents each which entitles them to all of the privileges and advantages enjoyed by members of the State Association.

During the year 32 meetings have been held in different counties of the State, these comprising field meetings and winter meetings more in the nature of schools, as well as organization meetings in new counties just opened up.

The Secretary wants to acknowledge the special efforts made on the part of Mr. C. H. Robinson, of Normal, and J. R. Wooldridge, Chicago, in the organization of new county associations and securing of new members.

The Annual Report was issued early in the summer and every member has received a copy. Additional copies are held by the secretary for distribution to new members and complimentary copies to schools, colleges, etc.

It is pleasing to be able to report that our efforts toward getting a complete course in beekeeping at the University of Illinois have not been in vain.

With the beginning of the new year Prof. O. Wallace Park, formerly of Ames, has been appointed as Associate in Beekeeping at the University of Illinois to have charge of all beekeeping activities there. Mr. Geo. E. King still remains as Instructor in Beekeeping at the University.

At the session of the last Legislature acting on the motions adopted at the last annual meeting, effort was made by the President and his Committee to get an appropriation of $12,000 per annum for inspection of bees in Illinois. The former appropriation was $3,000. Much effort was made on the part of different county association officers as well as special committee toward getting this appropriation through.

The Legislature finally allowed us a total of $7,475 per annum or a total of $14,950 for the biennium beginning July 1, 1923.

The present State Bee Inspector, Mr. A. L. Kildow, holds over and is active in the expenditure of these funds.

Financial report covering the year's activities is as follows:

Balance on hand November, 1922	$73.64	
Dec. 23, 1922, deposited memberships	59.85	
Jan. 22, 1923, deposited memberships	57.30	
Mar. 10, 1923, deposited memberships	66.60	
April 7, 1923, deposited memberships	57.00	
May 17, 1923, deposited memberships	41.30	
June 20, 1923, deposited memberships	42.40	
Oct. 23, 1923, deposited memberships	93.25	
		$491.34

Orders drawn as follows:

No. 1.	Scott-Edwards Co., programs	$ 9.69	
No. 2.	M. G. Dadant, telegrams	5.55	
No. 3.	J. Chanman & Son, honey strainers	3.50	
No. 4.	Samuel Cushman, expenses legislative	20.36	
No. 5.	G. H. Cale, placards, frames and signs for State Board of Agriculture	59.85	
No. 6.	J. R. Woolridge, organization expenses	23.40	
No. 7.	M. G. Dadant, yearly salary	100.00	
			$222.35
	Balance in treasury		$268.99

Respectfully submitted,

M. G. DADANT, *Secretary,*
Illinois State Beekeepers' Association.

REPORT OF EXPENDITURES OF STATE FUNDS FOR STATE BEEKEEPERS' ASSOCIATION.

The funds allowed by the State of Illinois for the State Beekeepers' Association amounts to $2,400 for the biennium or $1,200 for each year, beginning with July 1, 1921.

As stated in the last annual report the expenditures for the year July 1, 1921 to July 1, 1922 amounted to $1,300, leaving a balance of $1,100 in the treasury.

Your Secretary was able to carry on the affairs of the Association and issue the annual report as well as the monthly news letter, etc., and keep within the limit of $1,100 for the second year of the biennium.

The State Legislature repassed the same appropriation for the biennium beginning July 1, 1923 so that we are now spending money on the new appropriation.

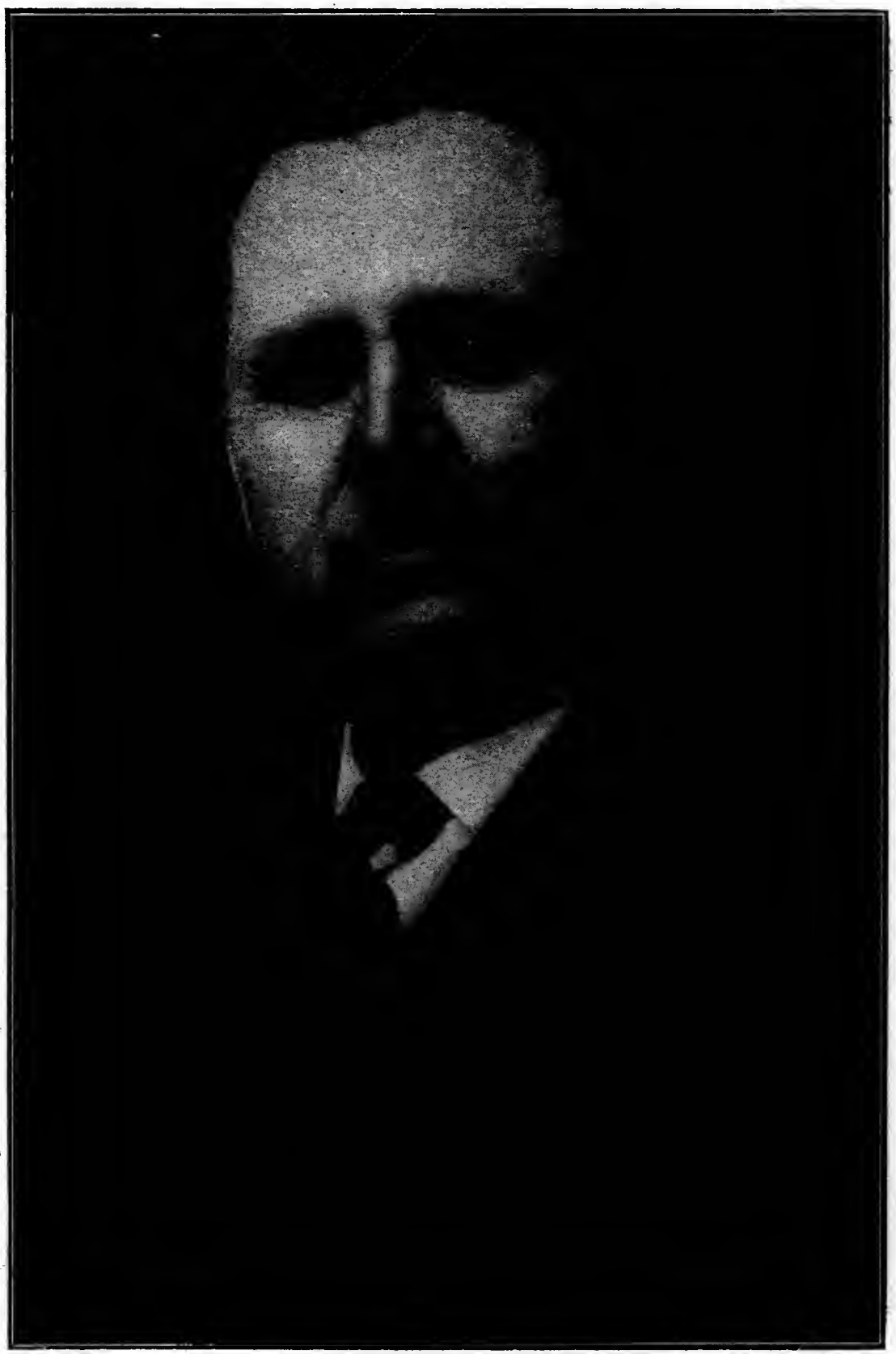
There have been no large expenditures so far, there being the usual monthly expenditures for the getting out of the monthly news letter, the mailing of some extra annual reports, etc.

Payment of imported speakers for our State Association as well as other expenses and expenses of the State Fair exhibit at Springfield are to come from this appropriation.

All orders drawn on the State funds must be O. K.'ed first by the Secretary of the State Association and then by the President of the State Association and finally by the Director of Finance of the State of Illinois. There is therefore a triple check on these expenditures.

Respectfully submitted,

M. G. DADANT, *Secretary,*
Illinois State Beekeepers' Association.



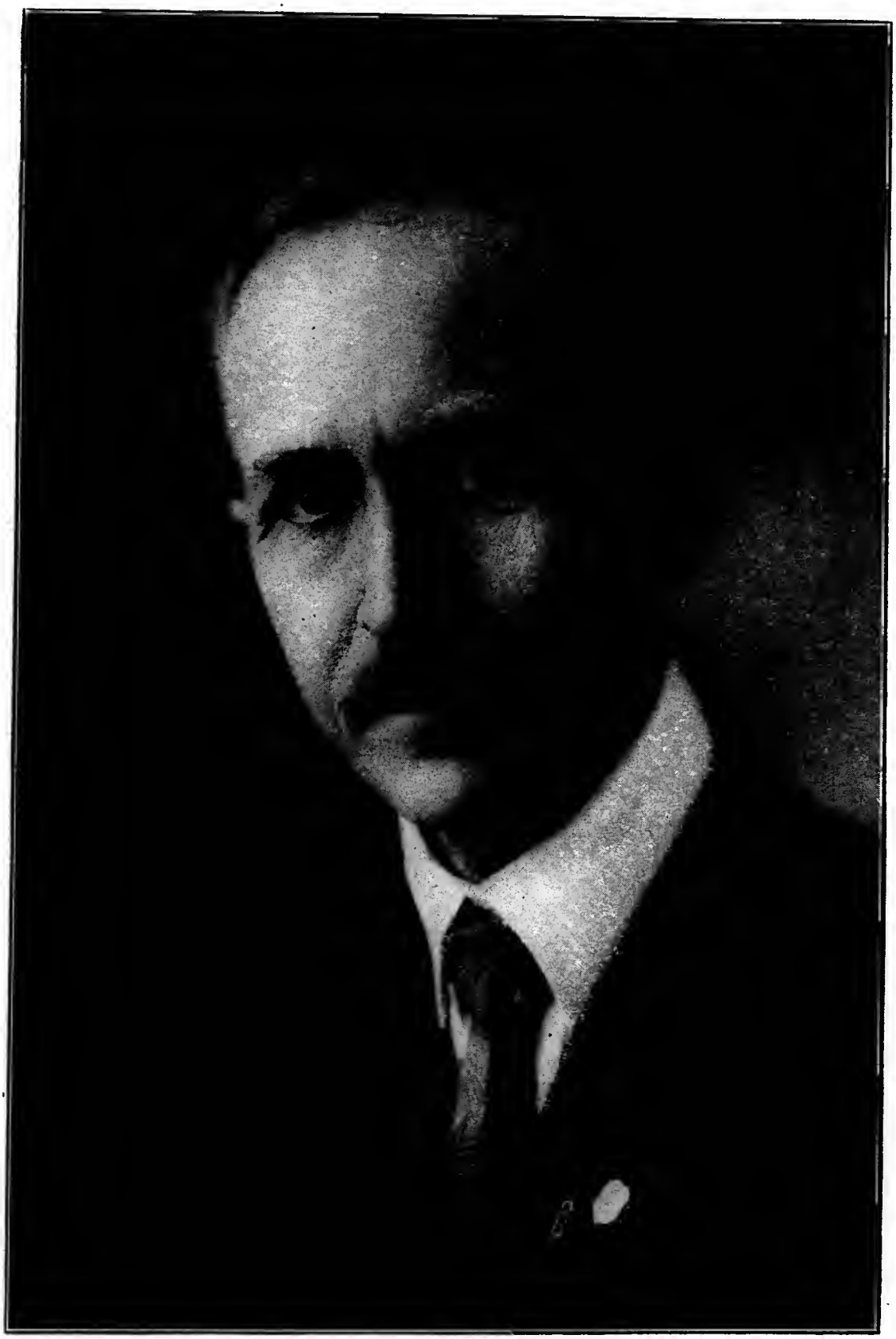
GEORGE SEASTREAM,
Treasurer of the Illinois State Beekeepers' Association.

REPORT OF TREASURER ILLINOIS STATE BEEKEEPERS' ASSOCIATION.

Balance on hand November 1, 1922	$ 73.64
Received from Secretary for dues during the year	417.70
	$491.38
Orders paid during the year	222.35
Balance in the treasury Nov. 1, 1922	$268.99

Respectfully submitted,

GEORGE SEASTREAM, *Treasurer,*
Pawnee, Illinois.



A. L. KILDOW,
State Inspector of Apiaries.

REPORT OF THE STATE INSPECTOR OF APIARIES, YEAR ENDING JULY 31, 1923.

(By A. L. Kildow, State Apiary Inspector.)

Just a little comparison to begin my report. From July, 1921 to July, 1922, we visited 739 apiaries having 14,523 colonies, 117 apiaries had A. F. B. and 72 had E. F. B.

This year we started on the plan of County organization and appointed deputy inspector for these counties, wherever a suitable man could be found. This plan worked very successfully, but we could not carry out the plan perfectly, on account of the shortage of funds. With the increase in our appropriation we hope, within the next two years to have the entire State under these organizations and active inspectors working in every district.

These various organizations hold field meets and demonstration meetings which have a two fold object.

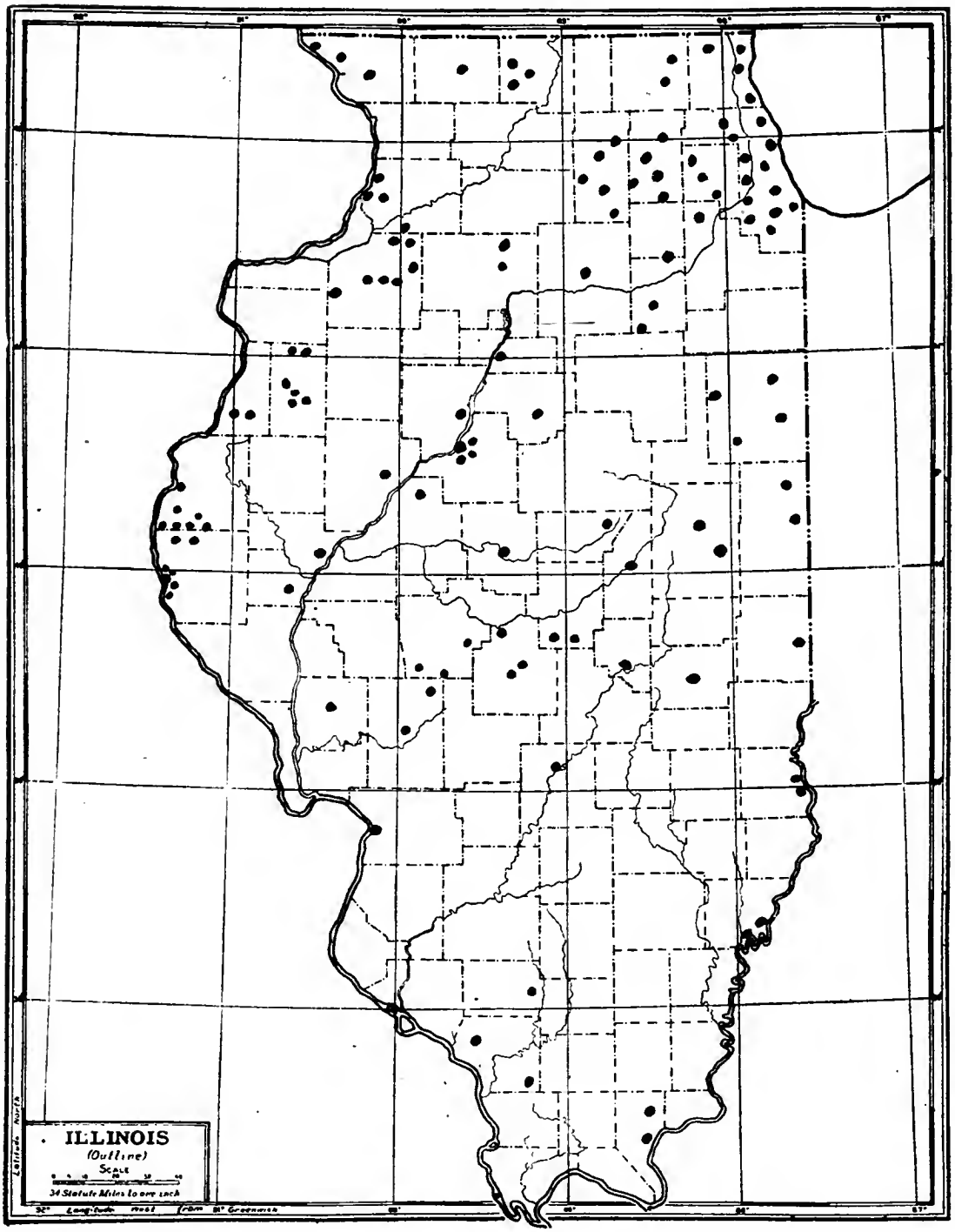
First, to create interest in keeping bees in an up to date manner and to obtain knowledge of the best method.

Second, to teach the beekeepers to know and how to handle bee diseases.

By these organizations the beekeepers are brought together and the actual work is demonstrated, and questions answered by the inspector as well as the condition of the district explained. Thus the inspector is able to reach a number of beekeepers at one time and to find out just who is in need of assistance. Under this plan from July 1, 1922 to July, 1923 we inspected 1,112 apiaries with 19,697 colonies and found 204 apiaries to have A. F. B. and 125 apiaries to have E. F. B.

Much of this disease is already cleaned up and in the north part of the State they are rejoicing over the result, while south and other portions are equally active in cleaning up and getting in condition for real business in beekeeping.

Fifteen counties have organized associations this year and those previously organized have been strengthened and stimulated to work for improvement of our industry.



Spots indicate localities in which American Foulbrood is known to be present in Illinois.

Date.	Number colonies.	Number apiaries visited.	Number apiaries A. F. B.	Number apiaries E. F. B.
July	4,292	160	28	9
August	2,390	137	23	16
September	1,784	104	22	14
October	195	17	1	1
November				
December				
January				
March				
April	1,318	125	14	15
May	5,598	286	64	45
June	4,115	283	52	25
Total	19,692	1,112	204	125

Respectfully submitted,

A. L. KILDOW,
Putnam, Ill.

REPORTS OF DEPUTY STATE BEE INSPECTORS.

REPORT OF C. F. BENDER.

During the summer of 1923 I inspected 1,712 colonies in 84 apiaries of which number 74 colonies in 20 apiaries were diseased with American foulbrood. Thirty-two of the diseased colonies were destroyed, and the remainder were treated according to approved methods.

The territory covered consisted of ten counties, in six of which I found American foulbrood. Most of the diseased apiaries were revisited some time during the summer, and I found that directions had usually been followed as far as the owners were capable of doing so. European foulbrood has almost disappeared from my territory. Occasional cases are found, usually in drone laying colonies or those having an old queen. Nothing like an epidemic of European foulbrood has appeared in my territory in the last five years.

Box hives are rare, the number being not more than one per cent of all colonies. Frame hives with the frames immovable are rather the rule than the exception, which makes the work of inspection much more difficult.

REPORT OF ELMER KOMMER.

In the season of 1923 I worked in seven counties, and found disease in every county. The counties worked are Whiteside, Henry, Rock Island, Knox, Mercer, Warren, and Henderson.

I found American foulbrood spotted, and in some cases had killed out every colony in the yard the winter before.

In Mercer, Rock Island, and Knox Counties there seems to be no American but Mercer County had several apiaries infected with European, scattered all over the county.

I found 15 cases of European out of 20 apiaries visited in Rock Island County and only 8 cases of European out of 10 apiaries visited in Knox County.

In Warren County I visited 25 apiaries and found 38 cases of American, and 16 cases of European, and 4 colonies had both.

In Henderson County I visited 7 apiaries and found 31 cases of American but no European. It was too late in the season to shake for the American when this visit was made, but treatment will be done the first thing in spring, or as soon as the bees can get enough from the field to live on.

While in Whiteside County visited 12 yards and found 26 cases of American and 12 of European, while 3 colonies had both.

In Henry County I did most of the work, I visited 130 apiaries and found 67 cases of American, and 122 cases of European, and 80 colonies had both the American and European. Apiaries visited in 1922 were practically free from disease this year and found better beekeepers than they were the year before.

In Mercer County I found 64 colonies of European out of 35 apiaries visited, and some or most of the colonies were in weak condition, the surplus honey in that county was very small.

During the year I inspected 339 apiaries, containing 2,876 colonies of bees, 162 cases of American were found, and 237 cases of European, 87 colonies had both kinds of disease, while I found 414 box hives still in use.

It is surprising how many kinds of hives and so-called hives an inspector will find during his work. I found bees in everything from a nail keg to a modified Dadant hive and it is needless to say where the most surplus honey was, the most up to date beekeeper was also.

Where up-to-date hives are used I find that the most of the beekeepers have adopted the 10 frame hive, next comes the 8 frame and some are trying out the larger hive with great success.

During the past season I only had to burn 11 colonies, those were so far along that they could not be saved. In most cases they did the treating themselves and got along very well.

Where Italian queens have been introduced I have never found a case of European foulbrood. I visited one yard in the northern part of Henry County early in the spring and we found almost all the colonies infected with European foulbrood (36 colonies in the yard) and some were weak, so a shipment of 36 queens was ordered and introduced by the owner, he not only cleaned every bit of disease, but got around 100 cases of comb honey from his bees. He knows the real value of good Italians.

	Apiaries.	Colonies.	A. F. B.	E. F. B.	Both.	Box hives.	Destroyed by me.
Whiteside	12	284	26	12	3	18	1
Henry	130	1,057	67	122	80	188	10
Knox	10	98	----------	8	----------	7	----------
Rock Island	20	219	----------	15	----------	44	----------
Mercer	35	324	----------	64	----------	52	----------
Warren	25	202	38	16	4	87	----------
Henderson	7	92	31	----------	----------	18	----------
Total	339	2,276	162	237	87	414	11

Report of E. W. Rittler.

During 1923 I have covered all of Adams County. I also did some work in Brown County in and around Versailles, Ill. Most of the beekeepers are thankful for the help and education and to know that by persistent fighting we can stamp out the foulbrood diseases. I find but little difficulty in getting beekeepers to shake and clean up as I demand. I hope to do more good by my inspection during 1924.

I began my work April 16 and closed inspection September 1st as bad weather set in and forced closing earlier than we expected.

Colonies inspected, 2,325.
Apiaries visited, 174.
Colonies diseased with European foulbrood, 136.
Colonies diseased with American foulbrood, 222.
Colonies clean, not treated, 1,967.

Report of Robert Watt.

I inspected Wabash County in 1922 and found bees in good condition. The territory was not gone over again in 1923.

Lawrence County was examined in 1923 and all the bees found free from disease.

About 85% of all colonies are in movable frame hives.

Report of J. D. Benson.

I inspected during 1923, 30 apiaries of bees containing 900 colonies. This was done in the vicinity of Galena, Ill.

Only one case of American foulbrood was found but practically every apiary had more or less European foulbrood.

I expect to have Jo Davies County as my territory for 1924.

Report of Frank Hofmann.

In all I examined about 300 colonies of bees and found 12 cases of American foulbrood. The territory comprised Lyons township in Cook County and the vicinity around LaGrange.

Report of Wm. C. Young.

I received my appointment this year very late in the season and was only able to put in a few days, weather conditions being very unfavorable due to the heavy rains and later the bees had started to rob so it was impossible to accomplish anything.

There has been considerable American foulbrood in this territory but no European.

Previous to my appointment I have during the past year taken care of several apiaries for different parties which I treated for American and European foulbrood. These apiaries came through O. K. this year with no sign of disease. I believe that with proper bee inspection in the

spring that the disease should be fairly well under control within another two or three years.

In all 95 colonies of bees were examined, 11 of which had American foulbrood.

Report of T. A. Kragness.

A supply house informed me this season that they had over 300 beekeepers in Cook County on their mailing list. Out of that number the majority have but few hives (from 1 to 5) and many are within city limits of Chicago.

Many of them place their hives in obscure places so they will be unnoticed by passersby and it is most difficult for an inspector to locate them as many of them do not belong to any beekeepers' association, nor do they read any literature on beekeeping.

Their proximity to source of infection is also greater within the city limits on account of the large amount of bottled honey used and the consequent number of sticky receptacles left out for the bees to rob.

It will be very difficult indeed to thoroughly eradicate foulbrood from Chicago and vicinity unless some extreme measures are taken to locate all of these smaller beekeepers.

The following is a report of my activities during the 1923 season:

Colonies visited, 1,007.

Colonies with American foulbrood, 214.

Colonies free from disease, 793.

Only a very few second inspections were made.

Very few have box hives but the majority allow their bees to build combs in the brood chamber of the modern hives without frames or foundation and may be classed as box hives as they cannot be examined any more easily than these. Sweet clover is our chief honey crop.

Report of Geo. Watt.

Herewith is my report as requested:

Number of colonies visited, 778.

Number of colonies with American foulbrood, 19.

Number of colonies with European foulbrood, 6.

Number of colonies in box hives, about 20.

Number of colonies in non-movable frame hives, 40%.

A second inspection was made with reference to colonies treated in 1922 and no re-occurance was found.

In cases where box hives were in use the owner was advised to transfer and where they were ready to buy, the necessary equipment assistance was given.

I think that 50% of the bees that were inspected were run for comb honey, this seemed not to be for a preference for comb honey but on account of the added expense of extracting equipment. Any more information that you might like will be gladly furnished.

Report of Frank Bishop.

During 1923 I examined 64 apiaries consisting of 868 colonies of bees of which 81 colonies were diseased, 75 colonies had American foulbrood and 6 European foulbrood, leaving 787 in good, clean condition.

I found 30 box hives. No second examination was made. There is still much inspection to be done in this section and many calls for help.

In instances where I went back the second time the apiaries were clean and beekeepers highly pleased and satisfied with the effective clean-up.

Our main source of honey in this section is white clover with a little sweet clover. In August and September we usually have a flow from heartsease, boneset and asters and some spanish needle and goldenrod.

Report of Harry L. King.

During 1923 I inspected 3,940 colonies of bees, of which 134 were afflicted with European foulbrood and 88 with American foulbrood. There were a total of 78 apiaries inspected.

American foulbrood was more plentiful during 1923 owing to the dry weather and consequent robbing of bees.

European foulbrood is scattered all over my territory while American foulbrood is mostly along the Illinois River.

All in all the situation is improving.

Report of W. H. Snyder.

I was asked to make some extended trips to different parts of the State with reference to the foulbrood condition.

In DeKalb County I found conditions very bad. Covered the county by auto from DeKalb and left nothing undone. I personally examined 806 colonies and burned and treated 166 of them that were infected with American foulbrood.

I had able assistance there in Mr. Tudor, Mr. Marshall and Mr. Chamberland, who stayed with me daily in cleaning up.

At Caledonia and Maple Park in Boone County I examined 320 colonies of bees. I found 6 colonies with American foulbrood just getting a start there. They are bothered more with European, but not of the virulent type.

At Elizabeth and Galena in Jo Daviess County I examined about 600 colonies and found only 2 colonies with American foulbrood which were burned.

European foulbrood exists there and of the most virulent type. There were about 30 colonies out of the 600 that were affected but requeening is being done which is curtailing this malady.

In the vicinity of Morris, Mazon and Gardner in Grundy County I visited some 1,200 colonies of bees. They are just getting a small touch of American foulbrood. They are desiring organization there and will try and complete a county organization in 1924.

There are a few cases of American foulbrood in some of the larger yards but they are keeping it well in hand.

In and around Joliet in Will County I examined 1,160 colonies and treated about 200 colonies affected with American foulbrood. Most of these were small beekeepers who had homemade makeshift hives, box hives, barrels, beer cases, and what not for a hive.

In the counties of Macon, Logan, Christian, Moultrie and Piatt there are only about 6 cases of American foulbrood out of possibly 1,800 colonies of bees. Three years ago they were about 30% infected.

I also made a trip from the north end of Vermillion County to the south side of Crawford County to ascertain the condition. I found four yards of American foulbrood on the Illinois side in and around Paris while on the other side of the line there seems to be much infection. This trip convinced me that Illinois is not spreading foulbrood across the border and that the Illinois beekeepers are profiting from careful inspection.

In the past season's work I personally examined about 5,000 colonies of bees. Have burned 500 colonies and have treated about 200.

Where the beekeeper has been warned once or twice by a deputy inspector and have failed to clean up, I took no chances but had him dig a hole while I sulphured the bees and then they were burned according to law. About 90% of the bees so destroyed were in old box hives.

Report of C. J. Canniford.

I was appointed in 1923 and only did two days work examining bees. The total number of colonies examined was 233, of which 12 were diseased with American foulbrood. These were found in two apiaries.

There are very few good beekeepers throughout the section where I inspected and American foulbrood has been scattered through this county since 1903.

Throughout Wisconsin nearly all the beekeepers have had American foulbrood and most of them have 2 to 4% of their bees infected yet.

Report of J. R. Wooldridge.

I have done some inspecting work since last report in the following counties: Kane, Lake, Cook, Jackson, Perry, Marion, Jefferson, Franklin, Union, Pulaski, Williamson, Johnson and Pope counties.

I found six counties affected with American foulbrood; and one of these (Cook) two yards European foulbrood, now clean.

Colonies inspected, 1,377.
Affected with American foulbrood, 116.
Affected with European foulbrood, now clean, 6.
Clean, 1,255.
Yards visited second time, 3.
Yards completely cleaned up per orders, 1.
Yards being cleaned account sickness, not completed, 1.

One yard—did not know how well enough after being instructed, afraid to try, too late in season when I was there to do the work, had spread from 2 colonies to 6 colonies during this time.

328 box hives, mostly in Southern Illinois.

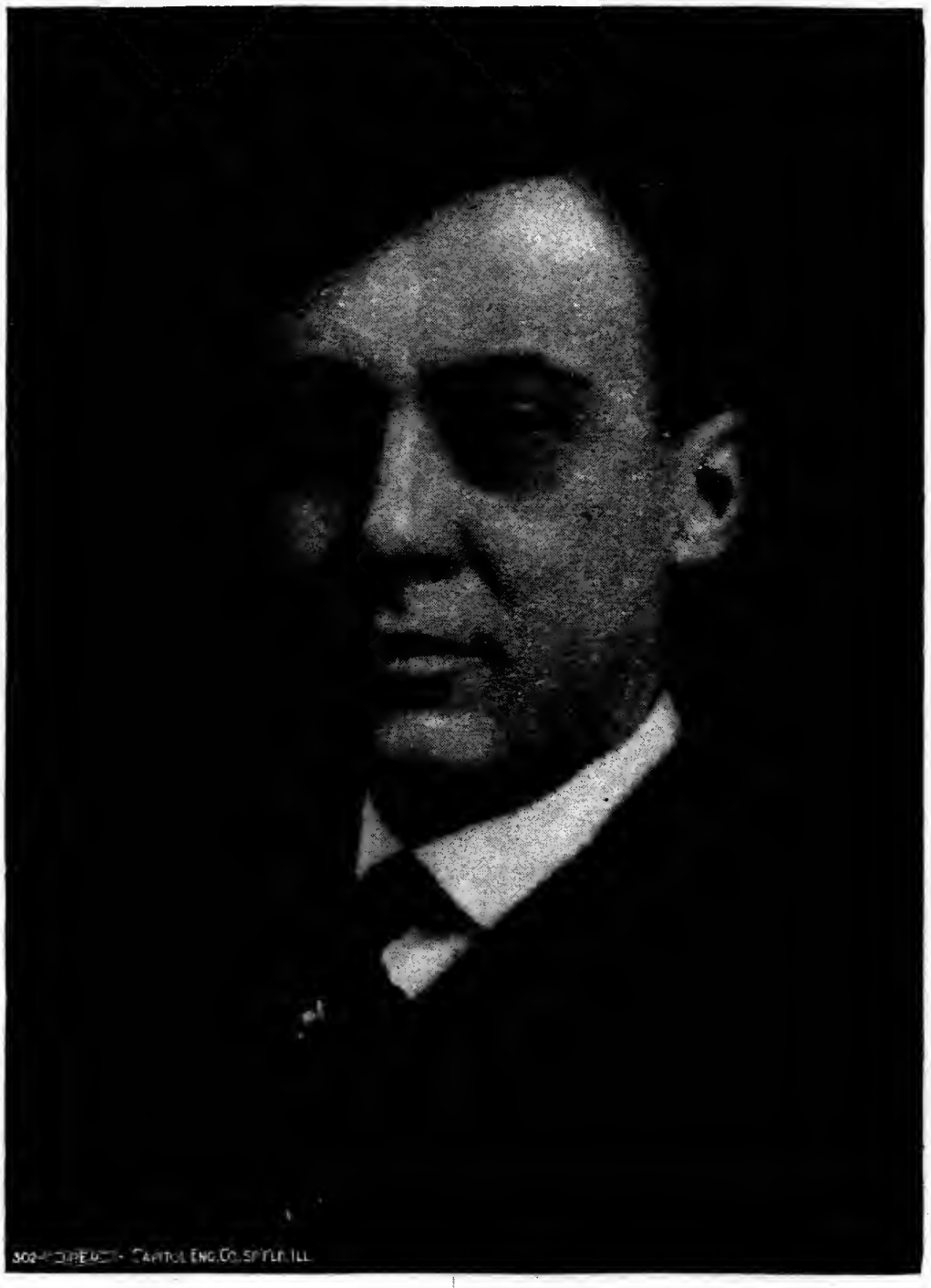
Honey both white and amber, of good flavor, but in bad shape, (lack of modern equipment) scarcely better than chunk honey, and would be impossible to pack and ship in usual way.

Counties named and not marked I did not find any brood trouble but work limited, and does not mean county is free but I did not find any disease where I visited.

Much better feeling towards inspectors than 1922 season and usually broad invitation to return soon.

Some localities where I did the treating myself in 1922 completely cleaned in 1923 when there, but this required positive instructions, personal work and sometimes the torch.

I was gratified to find no trace of disease at these points this year.



DR. ALBERT C. BAXTER,
Past President and Chairman of Committee on Exhibits.

INFANCY AND YOUTH OF THE ILLINOIS STATE BEE-KEEPERS' ASSOCIATION.

(By It's Original 29 Years' Secretary, J. A. Stone.)

Before the birth of the State Association, there had been for several years, a Sangamon County Beekeepers' Association at Springfield, of which P. J. England, of Fancy Prairie, was president, and C. E. Yocom of Sherman was secretary. Less than a score of members could be gotten out to the annual meetings.

On February 26th, 1891 Colonel Chas. F. Mills, Secretary of the State Board of Agriculture, was in attendance, and was the prime mover in organizing a State association. The writer tried to have the officers of the county organization elected for the officers of the State Association—but failed through the efforts of Col. Mills, who was made chairman of the nominating committee.

The committee placed in nomination the following:

For President—P. J. England, of Fancy Prairie, Ill.

For five Vice Presidents—1st, Mrs. L. Harrison, Peoria, Ill.; 2nd, C. P. Dadant, Hamilton; 3rd, W. T. F. Petty, Pittsfield; 4th, Hon. J. M. Hambaugh; 5th, Dr. C. C. Miller, Marengo.

Secretary—Jas. A. Stone, Bradfordton.

Treasurer—A. N. Draper, Upper Alton.

The report of the committee was unanimously adopted.

(At this organization of the State Association, but fifteen members were present—and at this writing, Christmas, 1923, we think but three are still living.)

During the year 1891 (the first of the organization)—through the efforts of the treasurer (Draper) the membership list ran beyond one hundred; he went for their dollars whether they kept bees or not, which resulted in a falling off the next year.

Hon. J. M. Hambaugh at that time was a member of the House of Representatives, and a beekeeper, was elected President of the Association for 1893, and was successful in getting our first appropriation from the State, to enable us to publish our annual report.

The first report we published in 1892, and because of failure to get an appropriation the next term of the legislature, we did not publish the second report until 1894. (The failure to get our second appropriation, was on account of Hon. Hambaugh moving to California).

We also delayed printing our second report, so as to take in our account of Illinois' honey exhibit at the World's Columbian Exhibit.

Our State Legislature was away into May, of the World's Fair year before they granted an appropriation for a honey exhibit for Illinois. And everything was supposed to be placed by the first of May. Our President and Secretary to be in charge of the exhibit, and to start at

so late a date, surely had their hands full. New York was making its boast that she had as much honey as all the other states combined. When we got our exhibits placed, we about doubled New York, and our State got the medal over all. It is a bronze medal, and now in the State Historical Library, in the New Centennial Building.

After the date of the World's Fair, we did not succeed in getting further appropriations, until the 43rd General Assembly, in the year 1903, when our third annual report followed, in 1904.

Following that date we never had further trouble in regularly obtaining the appropriations.

But then we began to try for a foulbrood bill, and worked with three or four assemblies (six or eight years), until the 47th Assembly, in 1911, when our bill was passed, giving us $1,000 a year for the two years.

At the time of the organization of the Illinois State Beekeepers' Association, the National Beekeepers' Union was in full vigor, of which Thomas G. Newman (Editor of the American Bee Journal), was the General Manager. If any of its members got into trouble through no fault of their own, the Union would help them out.

A man by the name of Clark, was keeping bees in the suburbs of Arkadelphia, Arkansas, and was ordered by the City Council to remove them. He refused to obey, and was fined; refusing to pay his fine he was sent to jail. He applied to the General Manager of the Union, who sent attorneys to defend his case, and after it had been carried to the Supreme Court of Arkansas, Mr. Clark won the case.

We published the whole court proceedings in our first annual report, 1892.

After that circumstance occurred, a number of similar cases were settled, by the General Manager simply sending a copy of that court's decisions to the prosecuting attorney in the case.

During the ten years that intervened between the second and third reports, the fees were not sufficient to pay the running expenses of the association, and the secretary was minus $19.00.

The membership was but little more than the number of charter members, and consisted almost entirely of the members who attended the annual meeting. But they were so loyal that Mr. C. P. Dadant moved that those present subscribe to pay the deficit. The secretary said no: he had thought of a scheme, to send out blank membership lists, and if it failed, he would be the loser. It worked; a single return mail brought as high as 21 fees, and by the end of the year we had a membership of 172. It made the work much greater for the secretary, but it was not long until the association voted the secretary a salary of $50.

Up to this time the membership fee had been $1.00 a year, but when the treasury could afford it, our executive committee consulted the editors of the bee journals, and together they agreed to place the fee at $1.50, and each share half the amount. Later this was raised to $1.75.

And now since the meeting of 1921, when it was voted to elect the five vice presidents from among the presidents of the County organizations, there is no telling where the membership will mount to.

REPORT FROM COOK COUNTY BEEKEEPERS' ASSOCIATION, 1923.

(By J. R. Wooldridge, President.)

Cook County Beekeepers' Association Activities: We have had two indoor meetings and two field meetings the past season. At the last three meetings I presided, having been elected President of the Association previously.

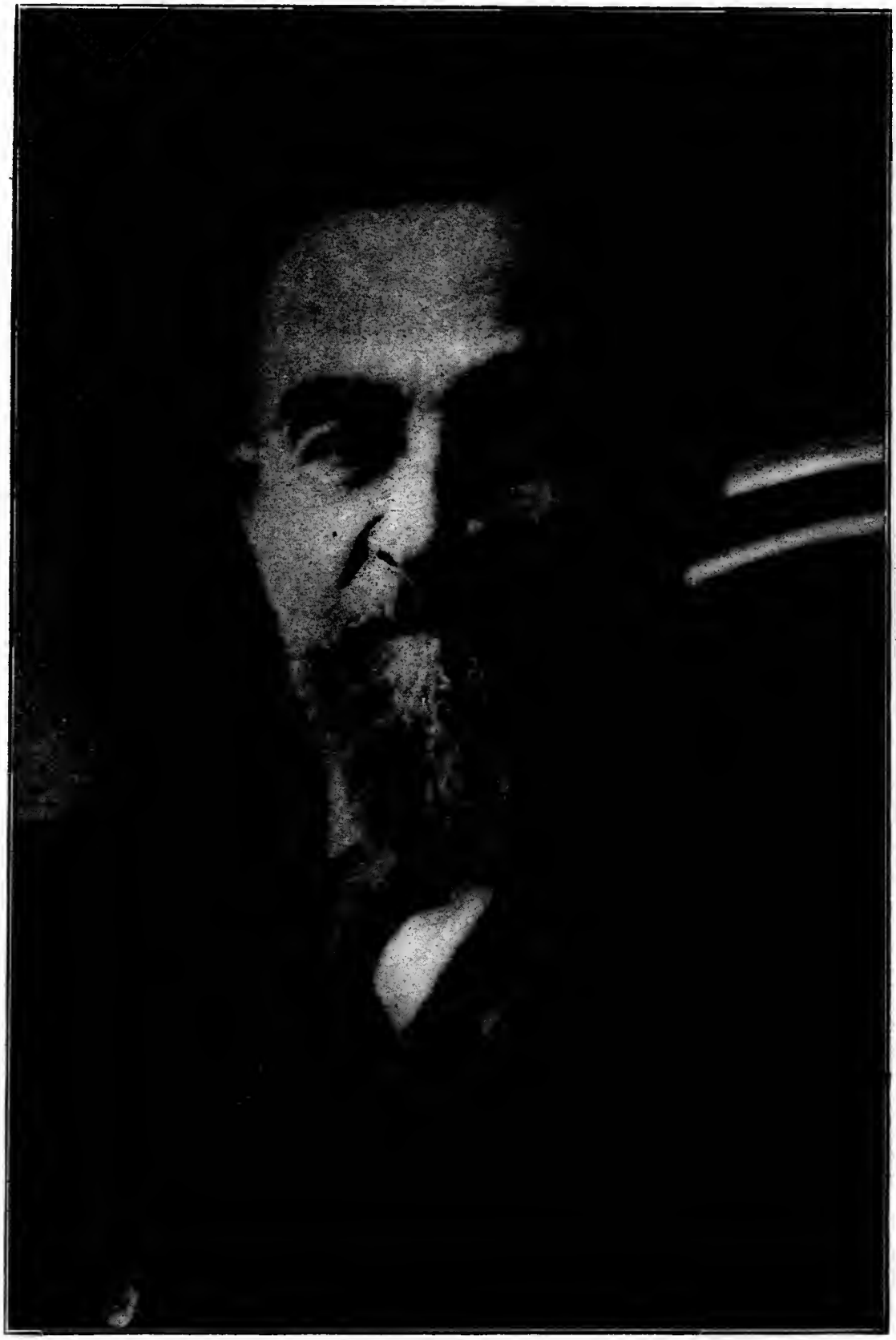
All meetings were well attended, especially the two field meetings which had the largest attendance in the history of the Association. Mr. A. L. Kildow, Chief Inspector, was present at both field meetings, demonstrating how to handle bee diseases. The demonstration was enjoyed by all present. At our second field meeting we had Mr. E. R. Root, Bee Specialist, Author and Instructor, who delighted those present in the way he explained all the phases of beekeeping. Those who missed hearing him were the losers.

The Association was successful in having two more State Inspectors appointed to the force, namely, Messrs. W. C. Young and Hoffman, two of the best beekeepers in the county and well posted as to bee diseases. This will materially help Cook County and adjoining counties to exterminate American foulbrood from this territory.

I am glad to say that we owe our existence to Mr. Samuel Cushman, who has spent much time, money and energy to bring this about. He is a man of ability and a hard worker, but does not seem to have the time to advance farther.

The Association seems to think that a new President must bring about something different, tangible and beneficial to the members, and they by a unanimous vote instructed their unworthy servant to appeal to the Illinois State Beekeepers, Springfield, to give to them free, under an authorized instructor, a two day course in Chicago for the benefit of all beekeepers of Cook and adjoining counties.

As President of Cook County Beekeepers' Association, I most earnestly appeal to you to grant this modest request and by so doing you will show to all unorganized counties within the State that you are advancing, active and can and will help them, providing they will organize and come in with us, and they too will be much benefited. When these facts are known at large you will see the State Association advance rapidly, grow stronger and be able to dictate a few good things for the beekeepers of the State.



C. P. DADANT,
Editor American Bee Journal.

HIVES NOT TOO LARGE.

(By C. P. Dadant.)

I read, not long ago, in an old bee book, that we *must not make our hives too large;* that there is a limit to the capacity of the swarm and that, to hive a colony of bees in a large room or in the corner of a barn is a mistake because bees can only gather a certain amount of honey, beyond which they cannot go.

This man reasoned correctly in asserting that a hive of bees has its limits and that it is out of the question, for instance, to have bees in a vast cave, filling it with honey, year after year, until it is full, as some Texas stories have reported in years past.

But the limit of a hive of bees should not be sought in the supers, which may be needed larger or smaller according to the run of the honey crop. The limit of a hive is in the capacity of its brood chamber, allowing its queen to lay a number of eggs within the time when the bees which will hatch from those will prove useful in harvesting honey. We should not limit our hives to a population of 60,000 bees, as advised by a modern writer, for fear that they will swarm (Iches, L'Abeille Domestique, page 35). On the contrary, we must use all means to get the largest possible number of eggs laid, within the time when the bees produced from those eggs will have the best opportunity of harvesting honey. We have often shown that a good queen is able to lay an average of 3,500 eggs per day for a long time, during the breeding season, at the time when the bees are likely to become useful honey gatherers.

It is true that bees in very powerful colonies are inclined to swarm. But bees from a very prolific queen, in a small hive, are much more likely to swarm than a much greater number in a large hive, because they may be more crowded for space. I cannot do better than quote Mr. Langstroth, whom I have often quoted on this subject as follows:

"Many hives cannot hold one quarter of the bees, combs and honey which, in a good season, may be found in large ones; while their owners wonder that they obtain so little profit from their bees. A good swarm of bees, put, in a good season, into a diminutive hive, may be compared to a powerful team of horses harnessed to a baby wagon, or a noble fall of water wasted in turning a petty water-wheel."

It seems pretty well recognized today that a colony should have enough cells for the queen to lay 3,500 eggs per day, during the active breeding season, and, in addition, at least 25 to 30 per cent more cells for the current supplies of honey and pollen needed to feed this brood.

The ordinary Langstroth standard frame contains about 7,500 worker cells, if these are regularly built. It is thus evident that the

10-frame standard hive contains about 75,000 cells, or only room enough for the breeding of a good queen, if every cell was filled, without the necessary space for the pollen and honey required for their daily needs. Our personal tests, made upon hundreds of colonies in different sized hives, showed us that not less than 12 to 13 Langstroth frames are necessary for the brood of a good queen, with sufficient supplies.

Dr. Miller used 16 frames, in two 8-frame stories for breeding in early spring, removing one of these stories entirely when the crop began.

The present tendency is to use two 10-frame hives, or 20 frames for brood chamber. My experience goes to show that this is too much. Our hives must be large enough to accommodate the best queens, but they must not be too large, in the brood chamber at least.

I propose to tell here of my experience. But it may be as well to speak first of some experiments by others.

Since the question of large hives was revived by the activity of Mr. Pellett, who urged the spread of our system, after having tried it in our apiaries, many experiments have been made. Mr. G. H. Cale, who is now with us also, helped in some experiments made at the Department of Entomology apiary, at Washington some years ago. He tells me that, with some 75 colonies in two-story 10-frame hives, they found one colony whose queen filled an average of 14 combs with brood scattered in the 20 combs. The balance of the colonies filled an average of 11 frames with brood. Adding three combs to each of these, for the supplies of pollen and honey necessary, we reach only the number of 14 combs, as required. Even the one best colony which filled 14 frames with brood, would not have needed much more than the 16 frames of Dr. Miller's method.

Now, about our experience with hives of different dimensions.

We began large production with 8-frame Quinby hives, the contents of which were about equivalent to 10-frame Langstroth hives, since the combs are both deeper and longer. We then made 10 and 11 frame Quinby hives, the latter being now called Dadant hives. As these did not prove too large, and as we happened to buy some 20 odd 20-frame hives, we concluded to experiment with the latter. These 20-frame hives, Quinby size, were not intended by their builder to be used for single colonies. He had conceived the idea of making economical hives, in which he put partitions and meant to use them for 3 or 4 swarms each. But this man was a dreamer, and he soon gave up in disgust. When we bought him out, we knocked the partitions out of his 20-frame hives and thus had what would now be called "long-idea" hives, intended to be in a single story, for both honey supers and brood chamber. This "long-idea" was long ago originated by a Kentucky man who claimed better success than with storified hives. Here was a chance to try this method, as well as to make sure of a queen's capacity to lay in a vast brood chamber.

Well, our twenty odd colonies did not give us satisfaction. There was too much room for the queen. The Quinby frame contains some 10,000 cells. A 20-frame hive gave us 200,000 cells, room enough for a large amount of surplus. But the trouble was that this surplus found

itself mixed in with combs of brood, or worse yet, in some cases nearly every comb had some brood and some honey. The honey had to be extracted from brood combs or too much of it left in the hive for winter. Besides, the space was too great for the bees to winter. Every fall we had to reduce the colony to about 9 or 10 combs. These surplus combs were much more difficult to care for than regular supers. Hence, the necessity to do away with those *too large* hives; since keeping two colonies or more in one hive was never to our liking.

We tried to put supers, small glass boxes, in two tiers, on the ends of those hives, in place of frames. This method of side supering was suggested by a very old beekeeper, Jasper Hazen, on page 41 of the American Bee Journal, for 1870. But that method, which he evidently had never tried himself, did not work. We found, in practice, that the bees would never put surplus honey in the lower tier of those boxes, for their instinct is to put the honey above the cluster, in a place of easy access away from the danger of robbers or moths. The only alternative was to cut down our large hives to 10 and 11 frames, Quinby size. We did.

This was not the only trial we made of *too large* hives. We had occasion, about 1876, of taking care of a large apiary of 10-frame Langstroth hives, owned by an old beekeeper by the name of Barlow, who had been a peddler of movable frame hives, but had neither the ability nor the strength to take care of his bees. His hives were portico hives, old style Langstroth, with the regulation spacing of a scant 1⅜ space between frames, from center to center.

When we placed these hives side by side with our 10-frame Quinby hives, we found, in early spring, that the Langstroth hives were ready to swarm by the opening of fruit bloom. They did not have enough room for a good queen to lay. They were running over with bees and actually appeared to be more successful than the colonies in our large hives. But when we added supers, half stories, they were filled with brood, in the Langstroth hives, while the large hives hardly needed them until the crop was on. When the time for the crop came, however, the colonies in 10 large deep frames got easily ahead of those in the Langstroth hives, because they had bred more uninterruptedly, for the crop.

The following year, seeing a recommendation of two-story 10-frame hives, we manufactured about 40 of those plain 10-frame hives, to use on our portico Langstroth hives. The result was that, in many cases, the queens moved from the lower story to the upper, and stayed there, but often there would be more or less brood in both. This gave us conditions in which our hives were neither brood chambers nor supers, but both or either, indiscriminately.

Our conclusion was that we must limit a brood chamber to the capacity of its queen. By doing this we are sure to get the brood in the brood chamber, and the honey in the super. It is true that there are exceptions, that some of our queens, even in the large hives, will move to the super, especially if there is, in that super, a proportion of drone comb. The queen seeks for drone comb, at a certain time of her laying,

each spring. Dr. Miller called my attention, in the apiary, years ago, to a fact which I had noticed, but upon which I had failed to ponder, that the workers often leave drone combs empty, while they fill worker combs around it, with honey, in the super, when the queen has no drone cells in the lower story. The queen seeks for drone cells at that time.

Why is it that the queen seeks for drone cells? Some beekeepers would have us believe that she knows that the eggs which she is about to lay are drone eggs. Huber wondered whether it could be that she knew, and he tells how some country women, who heard the statement made that a queen could tell the sex of her eggs before they were laid, protested that it could not be possible for a little insect to know that; when they, human beings, were entirely unable to know beforehand the sex of their progeny.

We now know, through parthenogenesis, that the eggs which are to produce drones are not fertilized, as they pass out of the ovary by the spermatheca, while the worker eggs are fertilized from that spermatheca. My father held a view which I have never seen successfully contradicted, that when the queen is fatigued by the constant laying of worker eggs for months, and the pressure of the spermatheca at each laying, which perhaps gives her a certain amount of sexual pleasure, she seeks for cells that are large enough so that she may let the eggs drop without pressure of the spermatheca. Thus would come the explanation of the fact that the queen seeks drone cells and evidently manages to make it know to the bees.

Dropping this disgression, I wish to state that a queen, in a large deep brood chamber, will rarely leave it to go into an upper story, unless there are drone cells, there. If she does go up into it, she will be less likely to stay there, if it is a very shallow story, than if it is a deep one. This is my experience, not on a few colonies only, but on hundreds, for years in succession.

The *too large* hives, 20-frame Langstroth or 20-frame Dadant, whether in one story or in two stories, proved much less convenient to us than those where the brood chamber is in a single story; because in the one, the honey that could really be taken as the beekeeper's share was more or less mixed with brood, and because the queen was likely to roam much more than in ample single stories, *not too large,* with half story supers.

Now as to an ample supply of honey for spring breeding; a store of honey which one of our most capable contemporaries calls "automatic feeder;" I consider a second full story of Langstroth combs, 10 frames, as too ample. It happened with me, a number of times, that so ample a supply of honey did not get consumed during the spring days. The result was that the bees filled the combs with clover honey, when the crop began, while these combs still had some fall honey, amber honey, left. The 10 or 11-frame deep hive contains ample honey for all emergencies, if it has been properly filled, the fall previous, by the bees. This, also, we have tested fully.

Confirming our experiences, Mr. Langstroth wrote us, in the last years of his life: "I am so well persuaded that the large hives are more

profitable, in Oxford, (his home town), for extracted honey, that just before my last spell of head trouble, I purchased two, of these large hives (13-frame hives), well stocked with bees, for my own use."

This simply confirms the argument of Charles Dadant, who was the first, I believe to put the question in this way:

"The number of frames to be used in a hive depends on their size; for we should manage our bees as we do our domestic animals, and give them as much space as is necessary to obtain the best results. What would we think of a farmer who would build a barn without first considering the number of animals and the amount of feed which he intended to shelter in it?".

However, hives that are too large in the brood chamber are almost as objectionable as hives that are too small. Such hives are more difficult for the bees to keep warm and their extra room is unnecessary until we find the crop of honey coming. The amount of room for the honey crop is quite another question than the amount of room for breeding and wintering. The supers should be numerous enough and elastic enough, so to speak, to hold small or large crops according to the circumstances, the yield and the duration of the harvest.

Let me close by stating that I do not desire to urge any one to change his hives and his system. It is too expensive; besides, many men succeed with smaller hives and frames. All I desire is to make it evident that there are fundamental reasons for making brood chambers of a certain size. After giving our testimony regarding the proper size of brood chambers, in our revision of Mr. Langstroth's book *"The Hive and Honeybee,"* testimony based upon many years of practical work with hives of different sizes in large numbers, we allowed the matter to rest.

But when Mr. Pellett, who is now with us in the publication of the *American Bee Journal,* and who kept bees on a large scale in Iowa, saw our system in practice, he was so highly pleased with it that he insisted upon bringing the large hive again before the American public. He did so, in a number of meetings. The upshot of it was a general inquiry into our methods and the publication of the "Dadant System of Beekeeping." It is not only in this country that the system has been discussed with favorable comments, but also in Great Britain, and generally where movable frame hives are used, for our system was very widely adopted in Europe, where we were the first to bring the modern top-opening movable frame hive, which represents the progressive system of the present day.

WHAT HUBAM CLOVER HAS DONE FOR ME.

(By Edw. A. Winkler.)

All that Hubam has done for my bees has been done for me, and my extensive venture with hubam clover in 1921 has been such a financial success and has made the outlook for beekeeping so pleasant and always promising, that I shall never regret that I was one of the foremost that took advantage of the wonderful discovery of Professor H. D. Hughes, Chief of Farm Crops of the Iowa State Experiment station at Ames, Iowa.

Outside of financial results comes that knowledge, that one always gets from experimenting with something new and untried. Knowledge, that unatainable thing, that we all strive for and never get, for at the end we know nothing; nothing compared to the vast amount of knowledge that is to be gained.

One of Winkler's Apiaries.

Still further is that thing experience; the more we learn, the more enjoyable life becomes to us. And were it not for the memories and knowledge we gain through life, dreary would it be in our declining years.

True, it does not pay to be careless and risk nearly all the wealth one has in a venture or experiment with something new, for I thought at one time that the weeds would get my first large attempt or experiment with Hubam Clover and with it my $2,340, that I already had invested in it. Yet I would go through it again this year and already

have made a much larger venture with new experiments and more knowledge to be gained.

Whether a beekeeper gets the habit from his bees to keep busy or whether it is the nervous strain that a large beekeeper goes under, there seems to be something always saying, "Let's go."

What I have realized indirectly from hubam clover has enabled me to accomplish many things that would never have been possible with me.

Friends and acquaintances I have made, the close contact that I have been able to bring about with the farmers in Will and now in Kendall Counties, brings about that realization that it pays to advertise, for if you have bees to place out through the country to pollinate the clover, fruit or other nectar bearing blossoms, how much better than to be well known and to have the fact known that your bees are a necessity to the farmer or fruit grower.

The matter of crop insurance that Hubam has made me realize is of prime importance for even though the spring and summer flows may fail, Hubam may always be looked forward to, to save the year.

There has been a marked notice in the lack of dysentery at the apiaries since I have been getting an abundance of Hubam honey, and this may be due to the fact that we have not produced any dark fall or amber honeys outside of one yard that was near a few acres of buckwheat the past year.

The equipment necessary to operate an apiary on a lean year is about equal to that used on a good year, the amount of labor the year round is but little more on a good year than on a lean one, therefore when a beekeeper can look forward to a possible chance of getting at least one of three or four flows during the season, with an abundance of Hubam being planted in close proximity to his apiaries, he has one extra good possibility of making his salt.

We have come to the firm conclusion that it is capacity that counts. The Greeks' system of business that is gradually making itself felt all along the market and grocery lines is one that the beekeeper can well afford to study. Smaller profits but a larger volume of sales is about all there is to it.

And the sooner there is such an overproduction of honey that beekeepers are unable to produce it with a profit, that much sooner they will be forced to organize into a cooperative sales system and advertise the oldest, purest and sweetest thing on earth. It is a lack of proper distribution that cheapens honey.

We have never had to feed a colony in the fall since Hubam has been grown in abundance near the outyards. Our last extracting or cleanup has always run heavy with fresh Hubam honey. We always feed sugar in the spring to stimulate or start brood rearing before fruit bloom.

A few sacks of Hubam seed screenings thrown along the roadsides gave splendid results the past season which brings out the fact that with the advent of Hubam clover, we almost forget that some years are white clover years and some are not.

Although Hubam has its place in the farm, and a very distinguished place it is, yet beekeepers should not overlook the place that biennial

white clover has and that the State University as well as most all county advisors or agents are advocating it now for pasture, which means a steady flow of honey to the bees within range until cold weather sets in providing it is the common variety, and is not pastured too closely or not closely enough. One way is as bad as the other. The past year I watched 30 head of young steers pastured on six acres, but towards fall there was not much left.

A field of Hubam following the removal of some grain would have more than paid and would have fit in with good results.

One dairyman and Hubam grower cut most of his 100 acres of Hubam for hay and has fed it in comparison with alfalfa and claims a slight gain in favor of Hubam.

A two acre field of volunteer Hubam produced three cuttings of hay of over seven ton total and equal to the best of alfalfa hay.

Several fields were sown at the rate of 3 lbs. of Hubam seed per acre with fair stands the past year.

Sweet Clover Proves Valuable Hay Crop.

In spite of the fact that sweet clover is considered primarily as a pasture crop, it has, nevertheless, proven to be superior to red clover as a hay crop.

No doubt there is some justification in the feeling that sweet clover is hard to cure into a high quality hay, although the hay does not have the pea green appearance of alfalfa, it is highly palatable, and when cows get used to it they clean up a large quantity, leaving only the very coarsest stems, and little of that.

Superior to Red Clover Hay.

In feeding value sweet clover hay has proven to be far superior to medium red clover. This fact was brought out in a report submitted by G. W. McVey, Will County Cow Tester. A herd under Mr. McVey's observation, owned by Martin Krusemark of Frankfort, fed on sweet clover hay, without silage, with a liberal allowance of balanced ration ranked second in milk production and third in fat during the month of February. Subsequent to this, the supply of sweet clover hay gave out and they were forced to feed red clover hay. When this change was made the herd began to decrease in milk, until at the end of two weeks the production per cow had diminished all the way from 10 to 16 pounds. This radical drop was made in spite of the fact that the hay allowance was almost doubled and the grain allowance increased. No other cause for the loss in milk could be ascertained, hence the conclusion that the hay was responsible.

No attempt is made to compare sweet clover with alfalfa, since alfalfa is recognized as pre-eminently the best feed for milk production. The facts brought out, however, indicate that sweet clover ranks high among the leguminous hays for cow feed, and, if cut at the right time, and properly cured, is far superior to medium red clover.

Much better results in feeding Hubam clover are obtained than from the biennial strain, as the stems are not so coarse and very little, if any waste.

FIELD BEES AT WORK.

(By Wallace Park, Associate in Agriculture, University of Illinois.)

The industry of the bee has been extolled throughout many generations, but after all, how little we really know about the details of the work she does and how long it takes her to accomplish any particular job. As yet we have no definite information as to the number of florets of clover a bee must visit on the average to secure a load of nectar. Nor do we have such information for a bee working on any other kind of flower. Certainly, there are difficulties a plenty in the way of getting these data but some day we are going to know more about such things than we do now.

While studying the importance of the honeybee as a cross-pollinator of apples, J. W. McCulloch of the Kansas Experiment Station, attempted to count the number of visits made by a bee on one trip. In no case was he able to keep track of the bee until it started for home but he followed one bee while it visited 61 blossoms, another 53, and numerous others that visited from 25 to 40 blossoms each. Nobody knows how many more blossoms these bees visited before and after the period of observation.

Another thing about which we know too little is the division of labor among the bees of a colony. It is pretty well established that, under normal conditions, bees seldom begin work in the field until they are between two and three weeks old. In the meantime they busy themselves at various duties within the hive, including such activities as feeding the brood, building comb and ripening honey.

It is said that when a young bee takes up field duties, it first carries pollen and later becomes a nectar-carrier. Perhaps this is the normal sequence but in case pollen should not be available, it is probable enough that the young fielder would busy itself at gathering nectar if it could be found. I have often wondered at what age a bee normally becomes a water-carrier or whether the needs of the colony alone determine this.

Behavior of Returned Fielders.

It is very interesting to watch the behavior of a returned fielder that has discovered a new and rich source of supply. It matters not whether the fielder is a nectar-carrier, pollen-carrier or water-carrier for the behavior is essentially the same in all three cases, except that the manner of disposing of a load of pollen is entirely different from the methods used for nectar and water, which are practically alike.

The discoverer of a new or bountiful source hustles through the entrance and into the hive with the air of one bent upon important

business. Upon reaching the comb, she climbs upon it and performs a peculiar dance, during which she shakes her abdomen vigorously from side to side, all the while running in arcs or circles, turning first to one side and then to the other. She is usually followed by four or five other bees and while she continues her dance, every now and then, one of the interested followers may be seen to leave for the field, until by the time the dancer is ready to depart, a dozen or more may have left the hive to search out the source of the rich find already discovered by the dancer.

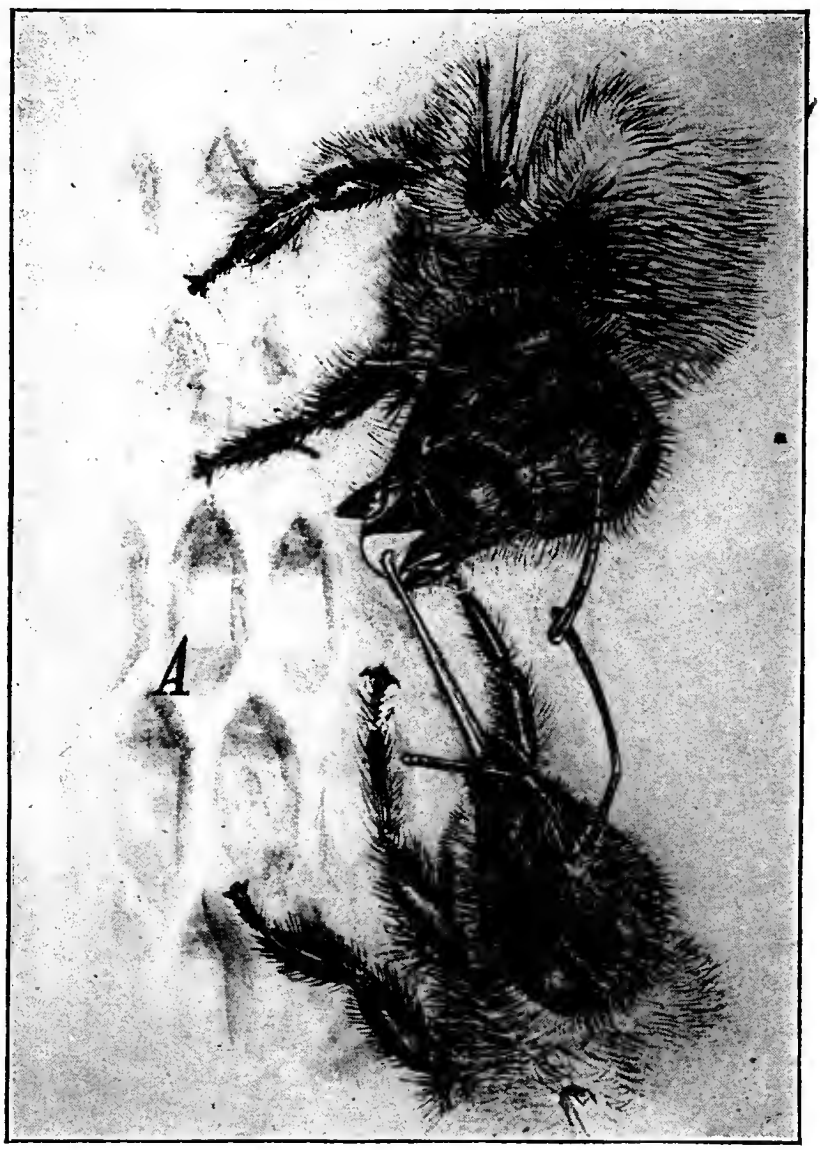


Plate 1. Showing how nectar is transferred from the field-bee (upper) to the house-bee (lower).

If a nectar-carrier, the dancer pauses long enough to pass out a taste of her booty to one or another of the nearby workers. But soon she meets a house-bee to which she gives a considerable portion of her load. As they approach each other, the field bee opens her mandibles wide apart and forces a drop of nectar out over the upper surface of that part of the tongue which is between and beneath the mandibles,

the outer or free portion of the tongue being folded back under the head. Assuming that the house-bee approached is not already loaded to capacity she stretches out her tongue to full length and sips the proffered nectar from the tongue of the field-bee as shown in Plate 1. While the nectar is being transferred in this manner, the antennae of both bees are in continual motion and those of the one bee are constantly striking those of the other. At the same time, the house-bee may be seen to stroke the "cheeks" of the field-bee with her fore feet as if coaxing for more and more.

When the field-bee has disposed of her load, she may start directly for the field, but in most cases she first secures a small amount of food either from another bee or from a cell. But before making her final start, she almost invariably gives her tongue a swipe between her fore feet, rubs her eyes and often cleans her antennae. Then with a quick look around, as if taking her bearings, she sets off for the field in great haste.

The behavior of a water-carrier under similar circumstances—to be observed most readily in winter or early spring when water is available only at intervals—is practically the same as that just described. But a pollen-carrier, after dancing a while goes to a cell and kicks off her load, after which she makes preparations for her next trip in much the same manner as described for the nectar-carrier.

The significance of this dance was discovered and interpreted simultaneously by Von Frisch in Germany and by myself. The dance is employed as a means of communication by which the dancer informs her hive-mates that a new and bountiful supply has been found. But the dancer is not able to inform them of the location of the new source, so that each bee is compelled to make its own search. This enables us to understand why robbing is so easily started and so hard to stop.

When the fielder returns with her load from a source which is well known to the others her procedure is the same as described above except that the dance is omitted.

Time to Gather a Load.

In order to find out how long it takes for a bee to gather a load of nectar, pollen or water, individual bees engaged in each of these pursuits were marked so that each one could be distinguished from all others. Observations were made for several consecutive days from early morning until the bees ceased flying at night. During most of the time there were two observers, so that the chances for a marked bee to pass unnoticed were reduced to a minimum. Only full strength colonies were used in this experiment and careful records were kept of the time of departure and return of each marked bee. From these records we were able to determine just how long each bee was gone from the hive and also the length of time she stayed in the hive between field trips.

In the case of nectar-carriers and pollen-carriers, records were secured in 1920 when honeyflow and weather conditions were very favorable, and in 1921 when conditions were much less favorable. The plants worked by the bees were the same for both seasons—white sweet

clover for nectar and corn for pollen. Figure 1 shows graphically the results obtained for nectar-carriers and Fig. 2 shows those for pollen-carriers. The data for water-carriers is pictured in Figure 3.

It will be seen from Figure 1A, that under favorable conditions, the greatest percentage (31%) of field trips made by nectar-carriers

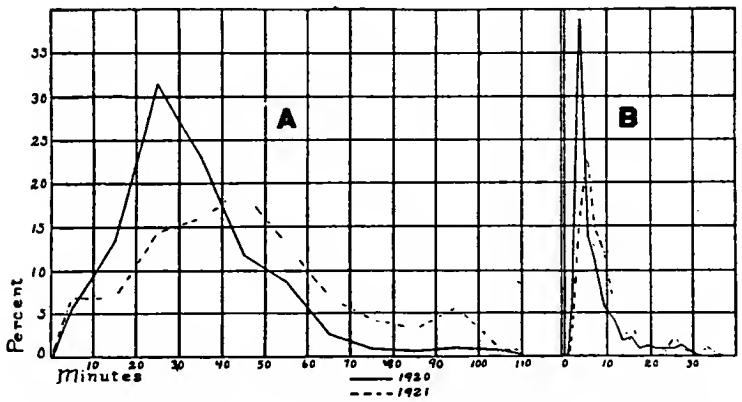


Figure 1. Showing the frequency distribution of time records made by nectar-carriers under favorable and unfavorable conditions.
A. Field trips. B. Hive stays.

consumed about 25 minutes each; whereas, under unfavorable conditions the greatest percentage (19%) consumed a little less than 45 minutes in the field. In Figure 1B, it is shown that the greatest percentage (39%) of hive stays in 1920 occupied 4 minutes; and that in 1921, under less favorable conditions of weather and honeyflow, the greatest percentage (23%) of hive stays lasted 5½ minutes. Others

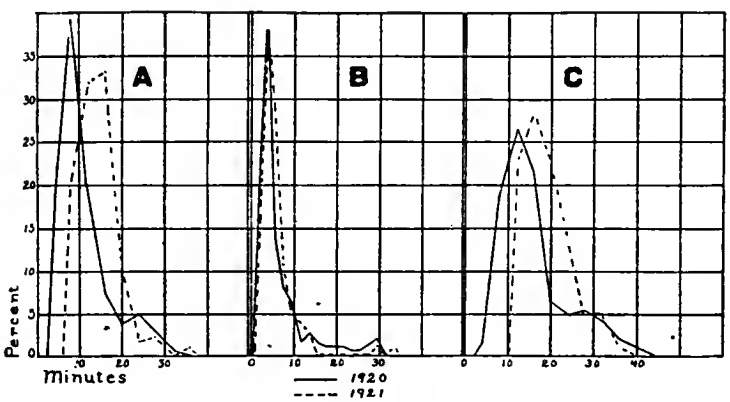


Figure 2. Showing the frequency distribution of time records made by pollen-carriers when gathering pollen from corn under favorable and unfavorable conditions.
A. Field trips. B. Hive stays. C. Round trips.

have reported that field bees commonly spend from one to several hours in the hive between trips but, as will be seen from these graphs, hive stays of more than 10 minutes were the exception and that the average was approximately 5 minutes. Then we may conclude that, when working on white sweet clover, a round trip will require from half to three-quarters of an hour or more, depending on conditions.

By referring to Figure 2, it will be observed that in the less favorable season (1921), pollen-carriers had to spend nearly 15 minutes to get a load of corn pollen; whereas, only about 8 minutes were needed the previous season. The poor season showed little effect on the length of the hive stay made by pollen-carriers—the most frequent time interval consumed in the hive being approximately 4 minutes for both years. The greatest number of round trips for these two seasons occupied about 12 minutes in 1920 and approximately 18 minutes in 1921.

The results obtained for marked water-carriers are graphically summarized in Figure 3. As would be expected, the time required to secure a load of water is quite short—only about 3 minutes—when the supply is near the apiary as was the case when these data were secured. The time spent in the hive by water-carriers was found to be from 2

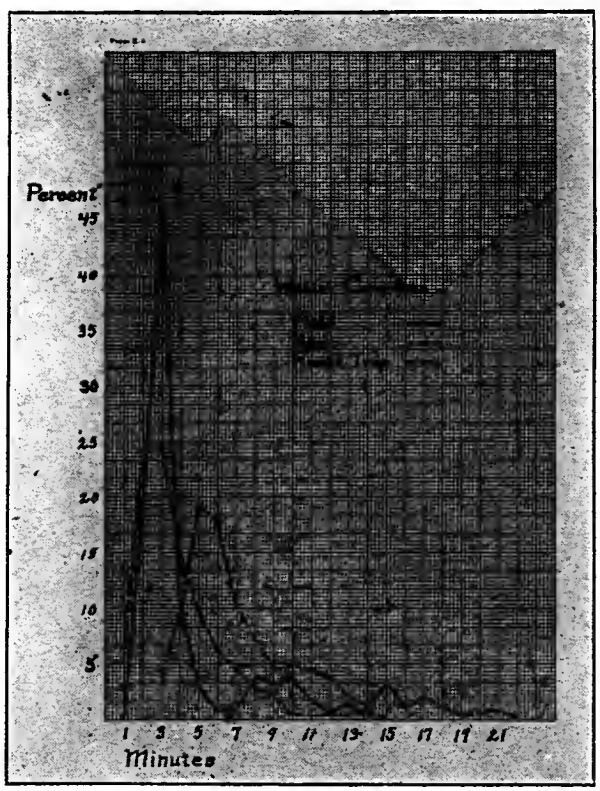


Figure 3. Showing the frequency distribution of time records made by water-carriers.

to 3 minutes, as a rule and very rarely did one stay as long as 5 minutes. In fact, a large proportion of the round trips were completed in from 5 to 6 minutes, and only a few lasted longer than 10 minutes.

One marked water-carrier which was found to be going two-thirds of a mile for its loads, spent nearly 10 minutes on the average in making its round trips. It may be of interest to note that this bee was making its trips regularly to a bucket of water which contained a little salt when it could have obtained fresh water from a small brook not a stone's throw from the hive. There is no question but that bees often show a preference for salt water, but whether or not they actually need it is still unknown.

Trips in a Day.

The maximum number of trips recorded in one day for a nectar-carrier was 24 in 1920 and 17 in 1921, and the averages were 13½ and 7, respectively. It was also found that nectar-carriers spent an average of about 8½ hours at field work in 1920 and about 7½ hours in 1921.

The maximum number of trips recorded in one day for a bee gathering pollen from corn was 20 in 1920, but only 11 in 1921, while the averages were 8 and 5½, respectively. As a rule, corn pollen was not available in the afternoon, so these figures represent only about half a day or less in actual working time.

The maximum number of trips in a day recorded for a water-carrier was 114, while the average was about 50.

Keep to One Line.

It was interesting to find that water-carriers, like nectar-carriers and pollen-carriers, continue at their special kind of work for days together. It was a little surprising to find that only in exceptional cases did any marked bee change its occupation during the period of observation which sometimes lasted from 5 to 10 days. During any portion of the day when no nectar was available from the particular kind of flower from which a particular bee was gathering its loads, that bee seldom went to the field, although nectar could have been obtained from other kinds of flowers.

A bee carrying pollen from a plant, such as corn, which produces no nectar, rarely was found to leave the hive after its particular kind of pollen ceased to be available for the day. But in the case of those bees found to gather both nectar and pollen on the same trip, when working on such plants as dandalion and apple, the bee usually began the day by carrying pollen only, but gathered nectar also when it could be obtained. As the day advanced, little pollen was to be had and the bee carried only nectar.

MARKETING HONEY.

(By E. R. Root.)

I almost hesitate to write on this subject, because it is one that has been so thoroughly hackneyed that the average beekeeper skips it; but the fact is, there is no more important subject than how to sell the product after producing it. It should be clearly understood that producing the honey is one thing, and selling it is quite another. There are tens of thousands who produce honey, while only a few engage in the business of selling it.

While roadside selling by the beekeeper has done much to stimulate the demand for honey, there needs to be much more work done on the part of the beekeeper to increase that demand. There are some things that will sell without advertising, but honey is not one of them.

If consumption of honey is to be increased materially the beekeeper must not only distribute honey-leaflets, but help his grocers to advertise his own honey. In the fall, sales can be greatly stimulated by putting on live-bee demonstrations in store windows. For this purpose a single-comb observatory hive showing live bees is most effective provided fresh bees are put in every three days. Along with the live bees should be displays of honey in attractive packages, both in glass and tin. The grocer should be supplied with honey-leaflets to show the food value of honey, and occasionally on big days the beekeeper can afford to give a live-bee demonstration by opening up a whole hive of bees in a large wire-cloth cage. If this can be placed in a show-window it will draw a crowd and help to dispose of a large amount of honey.

Although the commercial bottler is selling honey by the carload he needs the support of the beekeeper who produces the honey in helping to create a demand. My organization, probably the largest distributor of bottled honey in the United States, feels that the local producer of honey should not only help himself but in so doing he will help both in an effort to create a demand for honey. By working together we can not only dispose of large quantities of honey, but also help to maintain the price if not advance it.

At the present time the demand for honey in 5 and 10 pound pails, especially the former, is rapidly increasing. When the housewife discovers that, after she has bought honey in glass jars, she can save money by buying it in five-pound pails, she will buy in large quantities at a time. In other words, instead of selling her only a pound of honey in glass, we should sell, if possible five or even ten pounds in tin.

As a rule, however, honey must be *introduced* in glass. The consumer will seldom buy 5 or 10 pounds of honey at the start. He must

first be *convinced* that honey has quality and flavor, and a real food value. In roadside selling especially, the five-pound pails are getting to be the favorite package. These are neither too large nor too small. They are just right for the automobilist who desire to buy directly from the producer. If he likes the honey he will probably buy more of his grocer, who may be several miles or even hundreds of miles away from the roadside seller who started the ball rolling in the first place.

WHAT OF POOR SEASONS.

(By Geo. E. King.)

That all phases of agriculture are affected by seasonal variations is generally conceded. Beeculture is likewise influenced by many complex factors, several of which directly contribute to failures. Others may be converted into successes if they are correctly understood and apicultural activities are carefully planned so as to take advantage of them.

It will be both interesting and profitable to call attention to some of the conditions which govern the possibilities of both favorable and unfavorable seasons for apiculture.

We possess only meagre information concerning the effect of meteorological or weather conditions upon the yield of nectar by the plants. This information should however give some indication of some of the differences, as far as weather is concerned, between those years when abundant nectar is yielded and those when it is scarce. Under conditions closely akin to those of Illinois, records show that over a period of many years about 56% of the annual hive increase in weight occurred in June and about 22% in July, the remainder during other months. There is an evident alteration between good and poor years. A good year has more than the average of precipitation, especially if this rainfall is distributed proportionately over the preceding autumn, winter, and spring, continuing well into May. Clear days with a fairly wide range of temperature during the nectar yielding season are conducive to a heavy nectar yield. This of course holds true if the weather during the preceding months has been favorable for most vigorous plant development. There is a gradual decrease in nectar yield preceding a rainy spell and a gradual increase for about four days following it, after which a fairly steady yield continues for about ten days more. This applies particularly to herbaceous flora in our region. If the weather immediately becomes hot and dry the yield will not continue so long because whenever the maximum daily temperature exceeds 80° to 90° Fahr. it is too hot. This coincides also with the atmospheric pressure relation because the barometric pressure is generally higher when the weather is excessively hot and clear. It is due to the necessity for ample sunshine to promote the most favorable plant activity (metabolism) that clear days are so favorable to nectar secretion, inasmuch as other conditions are suitable. Even though the nectar yield is closely correlated with the daily range of temperature and atmospheric pressure acting jointly, these can affect it most favorably only when there is ample sunshine. This may explain why it is that nectar yields at higher altitudes fluctuate less and the resulting honey is often lighter in color than that from lower altitudes.

When covered with ample snow during the winter the nectariferous plants are better protected, and even though such winters are cold little if any harm results to them. However, a cold March reduces the nectar yield of the following summer regardless of what occurs during the winter months.

Although weather conditions are entirely beyond our control they are by no means unimportant, but apiculture may be made profitable in most instances even if weather conditions are sometimes adverse. Indeed if all seasons offered the most ideal weather conditions for honey production the situation would be much worse because there would be a greater number of inefficient persons engaging in this pursuit to the detriment of all concerned.

As the great majority of people who keep bees do so with the sole idea of receiving a profit from them the economic consideration might be tentatively taken as the factor which shall determine whether a season is to be favorable or unfavorable for apiculture. It will be obvious then that on this basis each beekeeper will in a great measure determine whether a season is to be a good one or a poor one for him. This then leads us to a consideration of some of the many factors which enter into the relationships between good apiary practices and seasonal variations and locality.

Too much attention can not be given to the location of the apiary because even under favorable weather conditions which ordinarily yield nectar do so only to the degree that the soil in which they are growing suits them. A plant in a soil unsuited to it can not yield nectar satisfactorily. Climatic conditions also play a great part here as many of our best plants do not yield nectar under all conditions of climate. If an apiary is located in the midst of plants growing under conditions not conducive to nectar secretion by them the bees will have to seek elsewhere for their forage. This doesn't mean, however, that the introduction of foreign plants will never prove desirable. Some of our best nectar yielders are introduced. Other plants that are equal or even better may yet be introduced and become valuable additions to our melliferous flora. Each beekeeper must acquaint himself with the flora of his region and take care to always locate an apiary where the forage for the bees is most certain and least objectionable. Of course other considerations also enter into this.

The factors already considered constitute what are often referred to as the locality and season. Of the two locality lends itself well to the possibility for improvement by the honey producer. A locality otherwise good but lacking adequate nectar bearing flora can frequently be greatly improved at small expense by increasing the desirable plants. If this is impracticable migratory beekeeping may be practiced to an advantage.

Of equal or even greater importance is that multitude of details which we term management. As apiculture has developed far enough to permit of almost complete control on the bees in accordance with their instincts, the apiculturist is in a position to control the greater proportion of the factors which enter into profitable apiculture. To better illustrate just what this means we may give these general essentials for

successful honey production as: (1) Ample nectar bearing plants in soil to which they are adapted, within range of the apiary, (2) Favorable weather conditions for nectar secretion and bee flight. (3) The maximum number of workers to the colony. (4) Such conditions within each colony as will make the storing instinct dominate over other instincts which might interfere with the storing of nectar.

Of these essentials the only absolutely uncontrollable factors are the weather conditions. If dependent upon weather conditions alone a failure could not occur very frequently because during a most unfavorable season some nectar will always be yielded while in medium to excellent seasons the yield usually exceeds the capacity of the bees present to gather it. The problem of management is a most serious one because the fullest success can be attained only when all four of these conditions are met at the same time, while if any one of them is not operative a partial or complete failure is certain to result. It then becomes a question of prime importance as to just how the beekeeper can best meet and solve these problems in the most efficient manner.

The 1923 honey crop over the United States generally has been poor. This applies peculiarly to Illinois, because in some localities of this State a fair honey crop has been reported while in others the crop has been a complete failure. Many colonies have merely supplied their winter needs while others have been unable to do more than eke out a bare existence. If many of these colonies have not been fed they will be a total loss through starvation.

With such conditions as those to meet is it any wonder that many become discouraged and conclude that beekeeping is very uncertain and that the additional expense of feeding will likely prove to be a greater loss? How many beekeepers are there who can afford to buy sugar enough to feed several hundred colonies of bees, or how many are able after a year of failure to buy and feed sugar to even a limited number of colonies? It may be recognized as a wise and profitable thing to do; but a large proportion of beekeepers are financially unable or are too discouraged to secure sugar for feeding after a season of failure. Perhaps too many of these same beekeepers disposed of a large crop of honey just the year before, at a price below the actual cost of production. It is quite apparent that this is the predicament in which too many bee men find themselves at one time or another. It is just at such critical times that the price of honey is likely to be the highest and the marketing problem offers least difficulty. This is not all; unfavorable years are most frequently followed by years well above the average for honey production. In the past this has been most unfortunate because the greatest deficiency in bees has occurred just at a time when they might have proved the most profitable. For this reason losses in bees at such times as the present are most serious.

Any rational system of apiculture should take these conditions into account. Those who do not thoroughly understand the business are enticed during the more favorable seasons into undue increase of colonies without regard to future possibilities for failure. Such beekeepers are content, because of obtaining a good crop of honey to sell it at a price which yields only a small margin of profit at the time,

while if their actual costs of production are computed on the basis of a series of years such sales will be seen to be ruinous to the beekeeper and too often fatal to the bees. Fatal to the bees because under such conditions they are so frequently allowed no reserve honey supply which might be necessary to tide them over a year of scarcity.

We have hitherto heard at one time or other remarks to the effect that we should not encourage colonies to rear useless consumers at times when no nectar flow is likely to be available. The same argument might be used here to discourage the leaving of more stores with the bees than are immediately necessary, because they might be consumed in breeding during the next spring. Of course the bees will draw quite heavily on their surplus stores during the early spring breeding period, and well they might because the working force of the colony must be completely renewed and increased at that time.

Whether a colony of bees is adding to its stores or not there is always an expenditure of vital energy in the carrying on of colony activities. Old bees must constantly be replaced by young ones or the colony will dwindle. It is generally conceded that a populous colony carries on its functions more economically than a weaker one, because a greater proporition of its bees are available for work in the field. This would suggest that even in years of meagre nectar production those colonies containing the most field bees will continue in better condition than will weaker colonies. What little nectar is available from day to day is collected and utilized by them. Although they consume it about as fast as it is collected it serves to keep them prepared for any short nectar flow that might come on and last only for a day or two. The weaker colonies without any reserve of stores are always unable to produce enough field bees because they are constantly working at a disadvantage. They utilize what meagre nectar supply their field bees bring in but that is always so limited that the rate of egg laying is always curtailed. In case of a short light nectar flow such colonies can do no other than fail to store honey because before they can catch up with the feeding of their hungry larvae the nectar supply has ceased and they are little better off than before. At the end of the season then such colonies will be found to be weak and destitute of stores for winter.

Observations made during the past summer at the University of Illinois on colonies of carying population and having in some cases no surplus stores and others an ample supply, have shown this very condition. It is possible to maintain colonies in excellent condition throughout the poor seasons at a comparatively small cost for feeding if they have had ample stores allotted them the autumn before when they were packed for winter. Those best supplied with provisions bred up rapidly and collected a small surplus from fruit bloom and other early flowers and maintained themselves throughout the summer. During the last week in August a short nectar flow provided them with ample stores for their winter and spring needs. The colonies that began the season with meagre stores failed to maintain their population and were unable to supply themselves with winter stores. The same is true where increase was made from other than the most populous colonies.

The quality of the queens is never tested more severely than in seasons of nectar scarcity. The cost of rearing them can not be so well appreciated at other times because the working force of the colony is not so severely taxed when nectar is available. Those colonies supplied with young queens during the late summer of an ordinary year withstand adversity best because their queens are not likely to be superseded at the time they should be laying most heavily. If a queen is inferior even in a poor season she should be replaced by a young one notwithstanding some loss is occasioned in the renewal. It will pay best in the end. Through skillful management such replacements may be made with only a slight break in the continuity of brood rearing.

We may recognize, then, two kinds of poor seasons, those that are made so on account of adverse weather conditions and those that yield poor returns, if any, because beekeepers fail to manage their bees and market their honey in the most skillful manner. The first kind can not be avoided entirely, but their ill effects may be minimized, while the other more common kind can be avoided almost completely by the adoption of the most approved and progressive apiary practices.

To the progressive and expert beekeeper the really poor season is infrequent and is usually an advantage. It helps him to select his best queens and to cull out inferior stock. It gives him an opportunity to apply better methods of management which also help out during better seasons, because the weaknesses in his methods are more conspicuous when conditions are less favorable. It gives him an opportunity to observe more closely the real value of his apiary sites and to choose better ones when possible. The competition of the many inferior keepers of bees who spoil both the field and the honey market during ordinary years is relieved, at least temporarily, by the poor season so that the expert beekeeper can take greater advantage of the better year which follows.

Occasional poor seasons then, such as 1923, are not to be looked upon as a complete loss. They should lead to greater efforts to improve the honey flora as well as better apiculture practices. They clearly indicate that Illinois beekeepers should keep more and better bees in larger colonies provided with more abundant surplus stores. That every colony should be given abundant protection in winter and storage room in summer. Swarm control methods that will avoid the waste of bee energy, and time incident to preparation for swarming should be employed. Vigorous queens should be kept in all colonies at all times. There is no reason for breeding being curtailed at any time of the year but early spring breeding should be encouraged to provide a full working force of young field bees as soon as nectar first becomes available in the spring. Much effort can well be directed to preparing the Illinois honey crop for market every season. This should be done in such a way that the article will reach the consumer in the most attractive condition but at the same time the expense of packing and handling must be reduced to the minimum. The poor season can be utilized to good advantage because it can be made to point out the faults of beekeeping practices. It culls out the inferior beekeeper because he can't make beekeeping pay. It therefore holds no terror for the progressive beekeeper.

ORGANIZING COUNTY ASSOCIATION.

(By J. R. Wooldridge.)

I have been asked to explain how I go about organizing different counties. They could scarcely have found a harder question to answer than this for the simple reason that there are so many different angles; so many different characters and dispositions to take into consideration before one can make a definite move and then one must be prepared to take whatever comes without flinching.

It will be remembered in my daily occupation I have an ever passing audience. People probably from the particular locality that should be organized. Much information is gathered in this way. Then by writing several beekeepers in the unorganized counties sympathetic letters, the replies are usually prompt and give me nearly all the facts. I usually state in the letter I have nothing to sell and nothing to give away, but do have a few facts to lay before them for their close consideration, all free. They need State help and the State stands ready to help them turn their loss into profit by good beekeeping, and it would please me to help them start to get this much needed help. Why not let us try and if they could furnish a meeting place with several present that perhaps we could use some films to illustrate more clearly the facts to those not familiar with them, and this would be free, but we would need a darkened room and 110 voltage power.

They are then told how to appeal to manager in charge of public buildings, to make it plain that this is all free, educational and a community good. I never fail to get the best, ALL FREE. Then the Farm Adviser is asked direct to give publicity and urge beekeepers to organize, and if he will send me the names and addresses of all beekeepers in the county. He gets very busy and a good list comes in. I then prepare and mail out all personal notices with the date and program combined.

The newspapers are then appealed to to support a community good. I outline the facts to them, and they are usually generous with their space and influence, and frequently give a nice write-up of meeting. The attendance is usually good, and after the explanation on beekeeping and the possibilities of bee culture they are in such a state of mind it is no trouble to organize them. I also tell them of the wonderful monthly letters prepared and sent out by Mr. M. G. Dadant, Bee Specialist, and our Secretary. He tells us just what to look out for in our own yards and should it appear he gives us the remedy in the same letter. He not only knows the past and present, but knows the future as well.

All are then invited to join in the discussion and ask questions. It is usually suggested to them that the Farm Adviser would be an ideal president because he sees everyone in the county. They elect him almost every time with other officers for the association, and the dues start to flow towards the treasury.

When this has ceased, I make my exit and go to the next county where similar arrangements have been made and proceed to organize them.

I visited two county fairs *free* with observation hive, having combs of honey, emerging brood, bees and beautiful Italian queen, beautiful samples of honey in all different containers put out, including several cases of comb honey. This exhibit attracted much attention, and I had to explain to them that it was pure honey gathered from the flower and placed in the comb by the bees. These were strenuous days for me.

It will be remembered that the money power of southern Illinois seems to be willing to help this cause in every way possible by doing my printing free of charge, furnishing leaflets, cards and circulars enclosed in my letters. In one instance 600 circulars requested for enclosing in their letters; in another instance 6,000 copies of another kind were sent out with the firm's mail.

This is a little hard on Uncle Sam, but it is spreading the news just the same, and I never knew there were so many people interested in bee culture in southern Illinois until the answers began to arrive.

Just think of my deplorable condition with all this mail coming in, and not a thing to do with, not an office, stenographer or typewriter, and my time so fully occupied that all my rest and sleeping time were taken up. Do you wonder why I am anxious to discontinue any activities and wish to return to private life, leaving the field clear to some good man who can help these deserving people in a better way than I was able to do.

It might be well to explain to the officers and members of this Association how I used so many postage stamps, with no authority from any one, nor with a thought of being reimbursed, but to my surprise the officers of the association have reimbursed me to the extent of $23.40, for which I am very grateful, and wish to thank all for this most generous act.

THE VOCATIONAL METHOD FOR TRAINING BEEKEEPERS.

(By Russell H. Kelty, Assistant Professor of Entomology, M. A. C., East Lansing, Mich.)

Inasmuch as an article in the last yearbook of the Illinois Beekeepers' Association mentioned a course in beekeeping for the training of ex-service men at the Michigan Agricultural College, possibly it would be in order to report briefly on the success of this work.

Ex-service men have received training in beekeeping at the Michigan Agricultural College since 1920. A total of several hundred students have received training in what is called the Vocational Guidance School, as a part of the rehabilitation service, provided by the U. S. Government for disabled veterans.

On account of the fact that a large portion of the students had elementary training only, it became necessary to provide special courses for the ex-service men. Therefore a special group of courses in beekeeping, poultry raising and horticulture was organized by the College. It was the aim of these courses to provide in the space of twelve months, instruction and practical training of a nature that would prepare the disabled veterans to make a living on a small farm from the proceeds from the bees, poultry and small fruits. It was to be expected that of the large number of ex-service men taking the work, but a small percentage would be naturally inclined toward beekeeping. However, it became necessary to insist that all trainees enroll in all three courses of instruction and many who at first thought they were not interested in beekeeping later became the most enthusiastic beekeepers.

Many of the trainees were seriously disabled. Some had lost limbs, others were suffering from mental and constitutional ailments. Practically all were afraid of bee stings at first. Some were so badly frightened that it required more than verbal persuasion to get them inside the apiary.

It must be realized, of course, in this connection, that the teaching of ex-service men in the pay of the Government is a far different proposition from the teaching of regularly enrolled agricultural students. The writer became satisfied, after one season's experience that the simple demonstration of practice in the bee-yard was far from satisfactory for teaching ex-service men beekeeping manipulations.

Therefore in 1922, every trainee enrolled in the beekeeping course was required to buy at least one colony of bees with his own money. At the time there were about one hundred and twenty-five trainees receiving instruction in beekeeping, and the site selected for the student apiary, therefore contained about one hundred and twenty-five

colonies at the beginning of the season. These colonies were bought from nearby beekeepers after inspection for disease and in some cases the trainees themselves secured colonies from home.

From the time when the trainees first invested their money in colonies of bees and equipment, there was a notable change in the attitude of the student towards the work. Whereas, previously it was necessary to resort to strict discipline to demand attention, once the trainees became the owners of bees no further discipline was needed to insure their attention. In fact, although the trainees had been warned to secure smokers before opening the hives, many had not done so when the colonies first arrived, but proceeded to open the hives any way, with the result that many were seriously stung, but with slight loss of enthusiasm, however.

The trainees were required to perform all their own work upon their colonies under the direction, however, of the writer and his assistant, Mr. J. C. Kremer. Some chose to produce honey only, many preferred to make increase only. Some wished to rear queens. In some cases transferring was necessary to get the bees out of the old hives in which they were purchased into standard equipment, and of course the entire class received the benefit of watching these manipulations.

After the apiary became crowded some of the trainees removed their colonies to previously selected projects nearby—the small farms previously mentioned, and continued the work there. By the end of the season the original one hundred and twenty-five colonies had been increased to three hundred and fifty-seven.

I do not have a record of the total amount of honey produced, but it was not large since the majority of the trainees chose to make increase. Throughout the season remarks were frequently overheard to the effect that "I wouldn't have gone into this beeyard for $50 a couple of years ago," or "There sure is a lot to this bee business," or "I'll bet I have a hundred colonies this time next year."

Although the student apiary was ten miles from the College the trainees made occasional trips to the apiary between classes merely to make sure that everything was all right in their bechives and in some cases the bees undoubtedly received too much attention. But the success of this method of giving instruction in beekeeping was completely satisfactory.

In the year 1923, with a smaller class of trainees the season started with about seventy-five colonies in the apiary and closed with approximately one hundred and eighty colonies, all purchased by the trainees the same as the year previous.

It was natural that keen rivalry should develop as to who was the best beekeeper and also there was some horse play among members of the class but all of a healthy nature and always kept under control. At the end of each season, trainees from distant states chose to sell their colonies to other trainees living nearby.

Occasionally criticism from commercial beekeepers regarding, "This training of a lot of students to help in the over-production of

honey" reaches our office. In this connection we wish to point out a few pertinent facts. In the first place a very small percentage of these men who have received instruction in beekeeping will produce honey commercially in later years. However, those who do not produce honey commercially are sufficiently well instructed in beekeeping to keep a small number of colonies efficiently. Those who do produce honey commercially are sufficiently well instructed to use the best methods and know enough about marketing to dispose of their crop without injuring the honey market. Since a large number of the trainees are more interested in poultry and horticulture than they are in beekeeping it is only natural that many will never give further attention to bees after leaving the College. It would seem, therefore, that the instruction given these ex-service men is an advantage instead of a disadvantage to beekeepers at large.

We wish to add that all trainees received instruction in all phases of beekeeping in addition to the actual experience of managing the colonies during the active season.

We do not have complete information, but of the many ex-service men who have taken the course in beekeeping at the Michigan Agricultural College, one is now a full partner in a six hundred colony beekeeping outfit at Manhattan, Montana, four trainees are full owners of outfits of from one hundred to one hundred and sixty colonies, two operate from seventy-five to one hundred colonies, seven operate from forty to fifty colonies, twelve operate from twenty to thirty colonies and at least fifteen are operating less than ten colonies, making a total of over two thousand colonies. Many of the trainees who manipulated colonies during the summer of 1923 are still in College and are not included in this list.

The tonic effect of the out-door work with bees is already noticeable in several cases of pronounced disability. One trainee who had severe attacks of palpitation of the heart when he first entered is now practically free from this trouble. Many of the students have remarked how much better they feel when working with the bees. In some cases a lack of immunity to bee sting venom nearly resulted in fatal accidents, but the gradual acquisition of immunity by daily scraping the skin and applying a slight amount of sting toxin resulted in eventual complete immunity.

It is the writers' opinion that these trainees who must make their own living on their small farms after leaving the college will be much better able to produce honey, if this is their choice, as result of their experience in actual management of colonies while in school. And they not only have had the experience but they also have invested money in bees and in equipment which would otherwise have been spent, in all probability, on light amusement.

TEXAS BEEKEEPING.

(By M. C. Tanquary, Chief, Division of Entomology, Texas. Agricultural Experiment Station, State Entomologist. Read at the Miller Memorial Library Dedication Meeting.)

The subject, "Texas Beekeeping" is entirely too big to do justice to in a short paper such as this one must be. I can touch only a few of the high spots covered by my subject, and if any beekeepers present are further interested, I will be only too glad to talk with them individually and at length.

Mr. F. C. Pellett, at a recent meeting of Texas beekeepers held at College Station, quoted a remark to the effect that one could go to almost any part of the U. S. and truthfully say that that section reminded him of Texas. If one wishes to keep bees on the plains, or in the mountains, along the seacoast, or in river valleys, he can take his choice. If he wants to work for honey production alone, or if he desires to produce bees and queens without surplus honey, or if he cares to indulge in migratory beekeeping, he can find suitable locations for all of these phases of beekeeping and still remain in Texas.

For those who wish some detailed information on the various beekeeping regions, I will refer them to an excellent article by Mr. H. B. Parks, published in the September, 1921 number of the *American Bee Journal.* In that article he divides the state into nine different general honey regions and then mentions a number of additional smaller regions as important sub-divisions.

I shall mention and give brief notes on just a few of the most important sources of honey in the state. While I shall make no attempt to give these in order of their relative importance, I am going to name cotton first, not because it out-ranks the others, but because I believe it is going to play a more and more important part in Texas beekeeping in the future. Cotton does not yield nectar in all parts of Texas, at least in paying quantity, but it is a very constant and dependable source of nectar in a rather narrow strip of territory known as the black land belt extending north and south, and almost bisected by a line running through Austin and Dallas, extending southward from the former for a distance of about 50 or 60 miles, and northward from the latter to the Oklahoma border. In this belt colonies of average strength may be depended upon for a surplus of 40 or 50 pounds while strong colonies should average from 75 to 100 or more pounds surplus. Cotton yields in other parts of the state also, but chiefly on heavy black soils, although occasional surplus flows are recorded from lighter soils. Cotton honey is light in color, of excellent flavor, but granulates very easily.

Mesquite, Cats-claw and *Huajillo* may be given together since they are the three principal honey plants of what is generally known as the great commercial honey producing section of Texas, a region including all that portion of Texas lying south of a line drawn from Del Rio on the Rio Grande to San Antonio and thence southeastward to the Gulf coast. This is the region that has made Texas beekeeping famous because of the large crops of light colored honey of the finest flavor, which is ordinarily known on the market as Uvalde honey because so much of it has been shipped from that point. Huajillo is pretty well restricted to the region given, but cats-claw is found throughout all southwest Texas, and Mesquite occurs over all of West Texas, northward into Oklahoma and westward to California. The quality of honey from these three plants is generally considered as being superior to cotton honey, but crop failures are more frequent with them than with cotton in the black land belt.

Some of the other important honey plants of Texas are various species of horsemint, Como, which is the Mexican name for a species of Bumelia, white brush, Brazilwood, Texas ebony, Raupor, a species of Ilex, willow, huckleberry, basswood, rattan, alfalfa, sweet clover, orange, bitter-weed and many others that might be mentioned. Some of these are limited in their occurrence, such as orange and basswood; others yield nectar in some parts of the state and not in others, such as sweet clover; some, such as willow and yaupon are valuable chiefly to build the colonies up on, and some, such as bitter-weed serve chiefly for winter stores.

There are vast regions of good beekeeping territory untaken and Texas welcomes additional good beekeepers. There are also immense stretches of territory where beekeeping is practically unknown, some of which at least may prove to be good commercial territory. An illustration of this fact may be found in the results of one of the tests made in some of our experimental work. One phase of this work was the testing of untried territory for beekeeping possibilities. Among seven apiaries established last year at sub-stations of the Texas Agricultural Experiment Station, one was placed at Lubbock, located in northwest Texas about 150 miles south of Amarillo. The 1920 census showed that in the thirty-six counties comprising this section of the state known as the plains proper, there were at that time only 34 colonies of bees and these were all in three counties. About the 20th of May, 1922, five three frame nuclei were established at the sub-station at Lubbock. There was not another colony of bees in the county and residents there told us that the bees would all starve to death or at least be blown away by the high winds. In less than three months all five colonies had drawn out all frames of foundation in two-story, 10-frame Langstroth hives and had made considerable surplus. The best colony had had several frames of capped honey removed from it and had produced by that time over 100 pounds of surplus honey. The honey was light colored, and of fine flavor and was eagerly purchased by the local stores at 30 cents per pound. It seems to have gathered chiefly from alfalfa, sweet clover and cotton.

Texas beekeepers are well organized for effective work in promoting the interests of their business. The Texas State Beekeepers' Association has an annual two days' meeting at College Station in connection with the Farmers' Short Course at the A. & M. College, and another meeting at Dallas in connection with the State Fair. They also have a commercial organization known as the Texas Honey Producers' Association with a capital stock of $32,500. A large percentage of the honey produced in Texas is sold through this organization under the name of Lone Star Honey. The honey is marketed, instead of being dumped on the market, with a consequent gain to the producer.

These two organizations have been very active in their support of investigational work in beekeeping and the disease control work. Through their legislative committees, and especially through the Manager of the Texas Honey Producers' Association, Mr. E. G. Le-Stourgeon, who is a member of the Legislature, good appropriations have been obtained for carrying on those two lines of work.

Because of the fact that College Station is located in a very poor beekeeping territory, the headquarters for the investigational work was moved to a place twelve miles southeast of San Antonio where ten acres of land was purchased for the purpose. A large, brick laboratory has been erected and a residence will be under construction in a few weeks for the Apiculturalist in charge, Mr. H. B. Parks. The main apiary will be located here and this laboratory will be headquarters for all the investigational work. Within about three and one-half miles, the State queen yard is located on land under a long time lease. Mr. A. H. Alex, as Experimental queen breeder, works part time with Mr. Parks and part time as apiary inspector for that portion of the State. In addition to the yards just mentioned, an experimental yard on a commercial scale is located at Dilley, Texas, about seventy miles southwest of San Antonio, and another at Roxton in north Texas. Seven other yards are now in operation at sub-stations of the Agricultural Experiment Station, and others will be located next year.

The beekeepers of Texas, as a whole, realize the importance of disease control and are ardent in their support of the work. During the biennium just closing, we had $10,000 per year for disease control and next biennium we will have a still larger amount. The extent of the work is shown in the fact that last fiscal year a total of more than 45,000 inspections were made and forty-two queen breeders' certificates granted. These forty-two queen breeders' certificates represent more than 14,000 colonies of bees. Disease control means so much to the beekeepers of Texas because of the large number of them who ship queens and package bees north, and of course, they could not do this unless their bees are free from disease. I was very much gratified to have the State Entomologist of one of the northern states prominent in beekeeping write me recently that he had never learned of a case of disease originating in a shipment sent from Texas. In the event such a thing ever does happen, I am anxious to be informed of it at the earliest possible moment so that the case can be traced to its origin. Last year only a little over one per cent of the colonies inspected were

found to be diseased, and this year the reports so far promise to show less than one per cent by the close of the year. We are very fortunate in Texas in that we have no European foulbrood.

I can not close this paper without offering my mark of respect to the memory of the wonderful man in whose honor this series of meetings is held. No words of praise from me could add one jot or title to the fame that is already his. I have never attended a beekeepers' meeting in Texas at which his praise was not sounded, and I am proud on this occasion to be the bearer of a tribute of honor from Texas beekeepers to that great man and beekeeper, Dr. C. C. Miller.

SOME PROBLEMS IN NECTAR SECRETION.

(By Frank C. Pellett, Author American Honey Plants, Productive Beekeeping, Etc.)

It is surprising that so little attention has been given to the problems of nectar secretion. Until very recently scant notice has been paid to the variations of the honey plants under different environmental conditions. It is doubtful whether botanists have long been familiar with the fact that a plant will secrete nectar freely under certain conditions and not at all under others.

Certain plants were known to be valuable for honey production and beekeepers assumed that they would produce wherever they might be found. An example of this idea is the buckwheat which is generally grown as a farm crop in parts of New York, Ontario and surrounding territory. Because buckwheat is a good source of nectar in this region where conditions are favorable, it is very generally planted in the Mississippi Valley by beekeepers, who expect to find it equally valuable in the Middle West, where it seldom yields to any extent. For many years I have heard buckwheat recommended for planting in Iowa for the benefit of the beekeeper, yet after a careful investigation in all sections of the state I found only one case where buckwheat could be credited as the source of an important yield of honey and there was some reason to doubt even the one. Bees do work on the buckwheat plant to some extent in Iowa but the results seldom show to any extent in the hives.

In central New York, buckwheat is the principal source of nectar and large crops are the rule. In this region it is common to find from 200 to 400 colonies in the single yard and those who have tried the experiment of dividing their apiaries into smaller number and establishing outapiaries, insist that they did not get sufficient increase in yield to pay the extra cost of operating. In that region there is much humidity in the atmosphere and the soils are inclined to acidity. In general it may be said that where buckwheat does best clover is not to be depended upon and where clover is a reliable yielder, buckwheat is likely to fail. There are neighborhoods, of course, where both yield nectar, for some soils are acid and on these the buckwheat will yield, and other soils are sweet and clover demands such a soil.

J. E. Crane of Vermont writes that in sixty years he has had only two crops of buckwheat honey on clay soil. He further states that this crop does best on light or sandy soils. Perhaps the explanation may lie in the fact that the lighter soils are more likely to be deficient in lime in his locality.

The Demands of Clover.

The clovers demand conditions almost the opposite of those under which buckwheat reaches its maximum yields. Conditions, however, which are favorable for alsike are not so good for the sweet clover, *(Melilotus)*. Alsike will grow on soils with a much smaller lime content than is required by either white clover or sweet clover. Apparently alsike also requires more humidity in the atmosphere for best results than is the case with sweet clover. All the clovers thrive on rich limestone soils. Warm days and cool nights are necessary for heavy yields of nectar not only from the clovers but from many other plants as well. It is for this reason that most plants yield nectar more freely in the higher altitudes than elsewhere.

As nearly as I can determine, sweet clover reaches its maximum in nectar secretion in the plains region of North America where the days are hot, the nights are cool and there is little humidity. I have previously outlined the region from Sioux City, Iowa, northward into the prairie provinces of Canada as the ideal region for sweet clover. Under the name of sweet clover are included both the white and the yellow varieties, *(Melilotus alba* and *M. officinalis)* and the Hubam clover which is an annual variety of the common white form.

In those regions all the conditions mentioned are combined. The soil is rich, there is ample rainfall during most seasons, and the difference between day and night temperatures is usually sufficient to insure a good flow of nectar. In this section in neighborhoods where there is ample acreage of sweet clover grown, yields of from 100 to 300 pounds or more or surplus per colony are not uncommon. The yields obtained there emphasize the need of a knowledge of the requirements of every important honey plant. When this is known, it will only remain to find a location where the particular plant desired is grown in sufficient acreage to insure success in beekeeping. As buckwheat yields in central New York or sweet clover yields in the Dakotas so will other plants yield when the necessary conditions are supplied.

Requirements of Cotton.

It is a well known fact that cotton yields little nectar on sandy soils while it is an important source of honey on the black waxy lands of north central Texas. All the factors that determine the nectar secretion are not entirely known as yet. In the region of San Antonio, Texas, the areas where secretion leaves off are sharply defined. To the north of the city is an escarpment running east and west; north of that natural line cotton is reported as a valuable source of honey, while to the south of it few reports of honey from cotton are found. To the northward the soils are black, while south of it they are sandy. In visiting many of the southern states I have found similar conditions. On the sandy lands the beekeepers find cotton of little value to the bees, while on rich clay soils they usually find it yielding. It would be interesting to know what other factors may also have an influence.

It is evident that several factors must be combined to get the best yields of nectar from a given plant. It often happens that plants will thrive in locations where they secrete little nectar.

Alfalfa an Example.

Alfalfa or lucerne is now commonly grown as a forage crop in suitable soils in many parts of America from New York to California. It requires a soil rich in lime, together with a rather abundant moisture content, in order to grow well. For abundant nectar secretion it also makes other requirements, such as hot days, cold nights and dry atmosphere as well as plenty of moisture at its roots. These conditions are found at their best in the high altitudes of the Rock Mountain region. I had a small field of alfalfa on my Iowa farm for several years before the bees secured any noticeable amount of nectar from it. One season when the spring was very wet, followed by hot and dry weather at blooming time, the bees fairly swarmed over the field. That particular season conditions were quite similar to those of the irrigated country where it reaches its highest yields. In such seasons, honey is reported from alfalfa by eastern beekeepers, but in the average year it is of little value to the honey producer in the eastern half of the American Continent.

The Practical Application.

From the above it will readily be seen that we need far more information concerning the requirements of plants. A beekeeper is likely to waste his time in trying to establish sweet clover in a region where buckwheat or heather are at their best. Likewise an attempt to establish heather on alkaline soils is likely to result in disappointment. The sourwood tree is one of the finest sources of honey in the southeastern states yet it will not succeed except on acid soils. Not only must we learn the soil requirements of the plants in which we are interested but we must learn what combination of temperature, humidity, altitude, and moisture will favor the heaviest honeyflows.

It is very probable that the regions where a plant gives the best returns to the beekeeper will be the place where it is of greatest value for other purposes. This being the case it should not be difficult to improve the bee pasture of a neighborhood by introducing into the agriculture the plants which give the largest yields of nectar. Sweet clover is proving to be the best legume so far discovered for the Dakotas where it is most valuable for the bees.

A careful study of the factors controlling nectar secretion may bring to light information of great value to the farmers as well as the beekeepers for, after all, their interests are mutual.

THE INCREASED BEE INSPECTION APPROPRIATION FOR ILLINOIS. HOW SHALL WE SPEND IT TO DO MOST GOOD AND PAVE THE WAY FOR A REALLY ADEQUATE APPROPRIATION.

(By Samuel Cushman.)

The Illinois Legislature has granted about two and a quarter times more money for State bee inspection than was previously available. Those who helped secure it should feel their responsibility and see that it is spent in a way to do the most good, in a way that will give permanent and lasting benefit.

Shall we spend this extra money in the same old way by doing intermittant inspection here and there all over the State in spots, wherever there is a demand for it as long as the money lasts and at same time tolerate colonies rotten with foulbrood right in the neighborhood? Or shall we adopt the best and most successful methods followed by other states?

Let us have an up to date committee of competent men study the bee inspection laws of all the states, pick out the best features of them all and combine them in a revised law for this State. Also learn the methods that have been most successful and have given the best results in enforcing these laws in other states and adapt them to this State. Let us have the best law of any state and the best system that will wipe out bee diseases and keep them from coming back.

The Most Promising Plan.

The most promising plan seems to be to concentrate on a small area and attempt to actually eliminate all bee disease from that area and then keep it from again getting a foot hold by frequent inspection. Then increase these disease exempt areas gradually as far as the money will go and keep them exempt. Those sections or counties having most bees kept in the best way will naturally be given first attention. They are now doing this in Wisconsin and especially in Michigan. Indiana now has almost overcome foulbrood in a large part of the state.

Concentrate Work on Cook County in 1924.

Last season less State bee inspection was done in this vicinity than in the previous summer on account of delay in appointing inspectors and because the extra money was not available until too late in the season. As Cook County probably has more colonies of bees than any other county in the State and they are very profitably handled she expects her full share of the State bee inspection next season and in the future.

We would ask for a Chief County Inspector, on full time the year through for work in this county and no work to do in any other county. We would make him entirely responsible for results in Cook County, credit him with success and blame him for failure to clean up the county. He should have an auto to travel in. Let him commence work in January and expect him and his part time assistants to find the location of every colony and record the name and address of their owners. To eliminate stray swarms in hollow trees or in the walls or under roofs of buildings liberal rewards could be offered to those who find them.

Quarantine the County Against Colonies From Outside.

Allow no one to bring bees on combs or other used beekeeping apparatus into the county without permission from the Director of Agriculture who will require an inspection bill of health before granting such permission. Such colonies that are permitted to enter to be inspected at least once a month during the following season of bee activity.

Let us have every colony in the county inspected in the spring as early as the weather will permit to detect disease in the live colonies and of greater importance to prevent the robbing out of hives in which bees have died of disease. Inspect them again before the main honey flow and again in the fall before brood rearing has stopped.

Microscopic Tests Will Prevent Mistakes.

Have a Chief County Inspector who is sufficiently educated in entomology, the science of insect life, and in bacteriology, to enable him to use a microscope and immediately determine whether an apparently diseased colony has American or European foulbrood or just smothered or overheated brood, spray poisoned brood or chilled brood that is decaying like any other dead matter because the colony is too weak to clean it out. If necessary he might be trained to use the microscope effectively or a nearby bacteriologist engaged to make the quick tests. Without such prompt tests there will always be uncertain cases and a delay in the prompt action so necessary. Or valuable bee colony property may be destroyed on suspicion to be on the safe side.

Need a Large Force of Workers at the Right Inspection Time.

The Chief County Inspector with all his time devoted to the work can spend two-thirds of the year locating the colonies and their owners before inspection time and in teaching the latter how to clean up foulbrood the right way themselves. Also in training his part time assistants in their various neighborhoods, who will help inspect the colonies during the short inspection season.

Experienced beekeepers with bees of their own can not well afford to act as inspectors on the few suitable sunny days at $6.60 per day which they are now offered although many will when they find there is

a real attempt to clean up the county and keep it clean, and make it permanent. The Director of Agriculture should be allowed to pay more in sections where living is high and where carpenters get $10.00 per day and hod carriers $8.00 per day.

It is the cleanup of a few apiaries with no attention afterwards that makes the work of no permanent value, wastes the inspection appropriation and disgusts many beekeepers with the whole thing. "What's the use," he says, "to go to any expense or make any real effort to keep free of it when apiaries all around you are more or less infected." I will save my combs, all but the worst, and keep it down and secure a crop in spite of it.

Have One County Entirely Clear of Disease.

Let us go the limit this season in Cook County with real bee inspection. Have a thorough clean up in one county in the State at least and demonstrate to the other counties what can be done. Let us insist that all that is necessary be done to clean up and then keep cleaned up in future. Let us make sure this county is SAFE FOR BEEKEEPING from now on.

Appointing State Inspectors.

I am certainly in favor of the principal of civil service examinations but our Illinois Commission seems to be hurting our chance of securing good inspectors when they are needed. I understand that the names of persons recommended by beekeepers' associations and by the Chief State Bee Inspector are turned over to the Civil Service Commission who send examination papers for applicants to fill out. The latter are warned very strongly by the commission not to make any inquiries about the matter but to wait until they are notified by the commission. The Chief Inspector, who is responsible for the success of the work feels compelled to obey this warning and keep still and say nothing and await their good pleasure. Is their attitude because postage and clerk hire are too expensive for the State of Illinois to afford to exchange a few letters with each applicant or because the secretary of the commission is overworked.

In some cases those who have applied in December or in January have been kept guessing until they received their appointment in July or August. This seems to worry and demoralize all the applicants and give them a bad impression. Perhaps the Civil Service Commission does not know that *the most important inspection of the whole year should be done in April or May* and that no beekeepers of any account can spend much time away from his bees in July or August. Why has no one told them? Perhaps because everyone is warned not to write them. What would you think of a farmer that did not notify the fall or winter applicants for harvest work that he wanted their service until harvest time arrived? Would he have any help when he wanted it? Would you have much respect for a city fire department that habitually sent its firemen to save burning buildings after the buildings had burned to the ground?

One genial applicant received examination paper after paper, each of which he filled out at considerable trouble and sent in but on receiving his fifth he ventured to write and ask them who in their office was eating his examination papers. He received a reply with an apology stating that each of his five papers had been located.

Wisconsin appoints their Deputy Inspectors in February so they know where they are, I hope that the one hundred and eleven authorities can arrange in future to appoint them early in March. In Wisconsin college students are employed to assist an experienced inspector. They are paid $100 per month for three months the first year. The second season they are paid $125 per month and are put in charge of an assistant.

I suppose that many beekeepers do not want to see an inspector. Personally I would like to be present when my colonies are inspected as no man is infallible. If this were required it would, however, enormously increase the cost of the work. Many beekeepers in Cook County say they never saw a bee inspector or heard of one working in their vicinity where apiaries all around them have more or less foulbrood. Some have asked for State help and never received it. If there is a real attempt to thoroughly clean up the county no doubt these men will do their full part but they lack confidence in methods of the past.

A Position of Trust.

An inspector's position is a position of trust. If you can not trust him with your money you can not trust him with your bees. Some inspectors always have some member of the owner's family look on while they examine the bees. Of course an inspector should understand how infection is spread and how to disenfect his hands, hive tools and clothes to avoid carrying it from colony to colony. If he knows, but is too careless about doing what he should, he may do more harm than good.

Is he intelligent, energetic and thorough? If he is half-hearted and does not fully rouse up to do well everything he undertakes and is always late when he attempts to catch a train, then deliver me from that sort of an inspector.

I do not offer this as from an expert in either foolbrood or bee inspection. I lack experience with foulbrood. I have not been able to take time for a thorough study of State bee disease laws or methods of bee inspection. I have just picked up a few things that I offer for your consideration.

When I was something of a honey producer in Rhode Island 35 or 40 years ago we had no foulbrood. When keeping bees in Baltimore there seemed to be no American foulbrood thereabouts but European foulbrood had hit the black bees in old box hives a few years before, but having Italian bees I escaped it as far as I know while there. Brood diseases seem to have swept the whole country in past 25 years.

Extreme Measures Needed.

When the United States Government steps in and prohibits interstate trade in bees from diseased apiaries as well as honey from foulbrood apiaries the big producers that are now shipping foulbrood honey will have to clean up and keep clean or quit. Then we can expect conditions to change for the better. This probably will not come until the majority of beekeepers demand it.

Such a law which would not go into effect until five years after its passage should cause no great hardship to producers and shippers.

EDUCATIONAL WORK DONE BY J. R. WOOLDRIDGE.

I prepared and mailed out almost 1,200 letters to interested people in Southern Illinois the past season relative to bee culture.

Held seven demonstration meetings at different points where instructions were given how to find the old queen, remove and at the same time successfully introduce the laying queen, thereby saving from fifteen to twenty-five days' time over the old and recommended way, right at the time when brood raising should be continuous.

Instructed as to transferring to modern hives by the various methods; treating American foulbrood, answering all questions to the best of my ability, giving a bee talk and obtaining new members for the County Association, which must affiliate with State Association who welcomes the new Association and stands ever ready to help them in every way possible. They were all abiding citizens of Illinois, paid their taxes in good faith and surely were entitled to a prorata rate of money paid in return for so doing.

Gave eight different moving picture shows; organized eight different counties with others asking for help. Seven counties affiliated with the State Association; scheduled seven different counties' field meetings and presided at them. Mr. E. W. Atkins, Bee Specialist, addressed all of these field meetings at length and was well received by all. Mr. A. L. Kildow, Chief Inspector, was also present and gave extensive instruction how to find and handle bee diseases and all were delighted to have his personal instructions.

The Southern Illinois Beekeepers' Association, Carbondale, Illinois, the parent Association of Southern Illinois, has seven counties already affiliated with it and all affiliated with the State Association at present. They realize their deplorable condition; lack of knowledge with no opportunity close at hand to gain it; how to handle bees successfully and do appeal and request that the Illinois State Association provide them free a two day course to be held at Carbondale, Illinois, during January or February, 1924, with an authorized instructor to teach them the principle of good beekeeping. They expect and should be granted this request, then the unorganized counties, seeing this being done by the State Association, will organize and affiliate. The State Association will then grow rapidly and become a power within the State—our appropriation will be enlarged and be granted cheerfully.

As Representative the Southern Illinois Beekeepers' Association, with the seven affiliated County Associations, have empowered me to act wholly as I think best for the body of organized beekeepers of Southern Illinois, and I do hereby recommend that this modest request be granted, and that I be authorized by the officers of the State Association to convey this cheerful information as soon as possible to all Southern Illinois beekeepers.

QUARANTINE MEASURES IN BEE DISEASE ERADICATION WORK.

(By B. F. Kindig, Read at the Miller Memorial Library Dedication Meeting.)

I have taken the liberty of striking out the word "control" and substituting therefor the word "eradication," because we do not use our quarantine power excepting in that area where we are trying to absolutely eliminate disease. In speaking of disease, I wish to be understood as referring to American foulbrood. We pay no attention to European foulbrood beyond explaining to the beekeeper how to handle the disease. We feel that European foulbrood is the beekeeper's problem and not ours excepting in a limited way.

We have at present under quarantine, twenty counties in Northern Michigan. Our quarantine forbids the taking into those counties any bees on combs or used beekeepers' supplies. We are also asking all shippers not to send package bees into that area with any food which contains honey. All the bees in those counties have been inspected and we know just where to expect an outbreak of disease. We are, therefore, able to disregard all bees in that area except where they have not been free from disease for two years. All yards where disease has been found are inspected at least once each year and when they are free from disease for two years we consider them comparatively safe for the future.

How do we know that no diseased bees are being brought in from outside? Every beekeeper in that area knows of the quarantine and its restrictions. In connection with the disease eradication work, we are vigorously enforcing the law relative to box hives and crossed combs. A large number of beekeepers have been caught with illegal hives. They are required to transfer or burn. The working out of this gives us a peculiar slant on beekeeping psychology. It almost always follows that when one beekeeper is compelled to treat disease or straighten up boxes, he at once becomes interested in seeing that every beekeeper within his range keeps strictly to the law. He becomes in a manner, a self appointed deputy of our office and through these men we get a lot of information about what is going on in their counties. We have had a very few breaches of the quarantine and I believe we have looked into every case of breach of quarantine that has occurred. When a quarantine is put on an area it is for a term of five years. Long before the five years have expired, that area is fenced off from the rest of the state by quarantines on adjoining counties so that when a quarantine is once placed, it practically amounts to a permanent quarantine.

The fact that a county is quarantined and that the beekeepers know that they are up against one or more inspections per year until passed as free from disease, gives each one a desire to do all that can be done to eradicate disease as soon as possible. Our rule is to give the beekeeper two years in which to clean up and pass inspection. Unless an unusual condition is present, we feel that if he has not cleaned up by the end of two years that it is time for us to clean the place up. It is generally known that we have cleaned up several places and most of the fellows feel that they would rather do it themselves. So, there is the stimulus that drives them to do all they can to eliminate disease as quickly as possible. As an example of the way this works out, I may say that in our area of seventeen counties which were under quarantine previous to this summer, there are only five outfits where disease has appeared this year. It is also interesting to note that these are all large producers of extracted honey. The little fellows practically all cleaned up with our assistance, the first season. I should say that our inspectors treat all cases of disease where found outside of the yards of the commercial honey producers. They also give the professionals such assistance as is needed. Through the quarantine and the clean inspection, the beekeepers are given new hope for their future as beekeepers. They are optimistic of the future in their counties.

We receive much help from interested beekeepers. For example, during the week of August sixth, it became necessary to clean up one yard of 31 colonies and another of 19 colonies, all diseased. For that work, our inspectors had the assistance of seven beekeepers from that and an adjoining county.

The quarantine of itself would be a joke unless coupled with a complete inspection of the area. The quarantine gets lots of publicity and there is always considerable discussion as to what the inspectors are going to do. By putting the lid on a whole area, we get the cooperation of the county agents. County agents always fight shy of law enforcement in a small way, but when their entire county is being covered they know that the balance of public opinion is with them and they give us much valuable assistance through the mediums of advertising and organization that they command.

Under our old method of working, the inspector always had more or less trouble and the work was not congenial to many. With the publicity that we now get, practically every beekeeper is looking forward to the inspection whether he wants it or not and needs no persuading regarding the necessity of doing the work.

As stated before, the quarantine of itself is useless. It is what goes with it that makes the quarantine of value. As an example, of the value of the quarantine, I might mention the case of nine counties in which we are attempting to eradicate disease without using the quarantine. All of these counties but three are isolated from each other. In one of those counties, we have had a resident inspector for about five years and he has devoted from ten to thirty days each year to cleaning up disease. Last fall this inspector reported the county as free from disease. This spring reports coming to our office indicated

trouble in two sections of the county. An investigation by the inspector revealed that a public auction had been held in an adjoining county and considerable number of diseased colonies and some second hand equipment had been distributed in what was previously an area free from disease. Such occurrences as this are very discouraging to an inspector who has made a sincere effort to keep his territory free from disease. It is also very expensive for our department. Such things do not happen where the area is under quarantine.

The quarantine is an experiment which has proved to be of much value to us. Our quarantine authority has been in use for only two years but we feel now that it is necessary for best results in our work. It takes away much of the risk of reinfection of clean territory. It gives our work publicity which we consider as very essential to harmonious work with the smaller beekeepers with whom we have had no contact heretofore. While it inconveniences some persons, yet it operates for the benefit of all by taking away the constant danger of an infected outfit being placed within range of a beekeeper who has no disease. The commercial honey producers are unanimous for the quarantine.

BEEKEEPING IN THE SWEET CLOVER LANDS OF NORTH DAKOTA.

(By R. L. Webster, Read at the Miller Memorial Library Dedication Meeting.)

When I came to North Dakota two years ago this month to take charge of the work in economic entomology at the North Dakota Agricultural College I was taken by surprise when I was told that it would be a part of my duty to encourage the beekeeping industry in the state. Like most of those people who have spent the greater part of their life in states farther to the south of the Dakotas, I was quite unprepared for the idea that beekeeping could ever be much of a success in that section of the country. Having gained some little knowledge of beekeeping previously in Iowa, I began at once to make the acquaintance of those beekeepers with whom I could get in touch, either in person or by correspondence.

A year later, in company with Frank C. Pellett, I made a long automobile trip through the Red River Valley, which brought out more strongly than ever that this North country was still not so far north that bees could not be kept at a profit. As a matter of fact, two North Dakota beekeepers were visited on this trip whose yards were within a stone's throw of the Canadian line. In one case, the bees were said to gather nectar from some of the fall flowers across the international boundary, regardless of the duty on honey coming into the United States. Every beekeeper visited on the trip, which began at Winnipeg and ended at Fargo, reported high average yields of honey. Manitoba beekeepers were fully as successful as those in North Dakota, though the latter were fewer in numbers.

Those that have given much study to nectar secretion tell us that the North country is especially favorable to honey production because of the excessive amounts of available nectar. The same honey plants secrete nectar in greater amounts in the more northern range of their distribution. According to some of these authorities, those changes from starch to sugar that take place within the plants go on more rapidly at temperatures somewhat lower than normal. Slightly higher temperatures retard those changes. Most chemical reaction, and we must ultimately consider these changes as chemical reactions, take place more rapidly at higher temperatures. As a matter of fact, the higher the temperature in many cases the greater the rate at which the change takes place. That this is not generally true of changes that are intimately connected with plant or animal life is well known, since a rise in temperature much above 120° Fahrenheit very soon causes the death of the organism concerned.

The cool night temperatures in this North country are especially favorable to those changes that go on within the plant and which have to do with nectar secretion. Cool nights are characteristic of that portion of the country with which I have to deal. In fact, these are in sharp contrast to the frequent sultry, uncomfortable nights of the corn belt states of Iowa and Illinois. As a rule only rarely in North Dakota are there nights when it is at all uncomfortable.

But it is not sufficient that merely an abundant nectar secretion be available. It is necessary that the bees leave the hives in order to take advantage of the heavy nectar flow. Sunshine is another characteristic of this region. A great number of bright days during the honey flow bring the bees from the hives in large numbers to take advantage of the pastures usually close at hand.

Still another factor is the length of daylight during the period of the greatest honey flow. With bright days and long days of activity for field bees, together with the excessive available nectar, there is adequate explanation of the remarkable success our beekeepers have achieved at this early period in the development of the industry.

Now it is possible to have all these things, and still have no surplus honey. Bee pasture in extensive amounts must be available if the business of producing honey is to be a success in any location. It is the great abundance of sweet clover in this arear that is mainly responsible for the large honey crops. One of our Fargo beekeepers, who has kept bees on the same location for the last twenty years, tells me that he was content with a 40 or 50 pound yield for the most of that period and that only during the last four or five years, since the introduction of sweet clover, have the exceptionally high yields become possible.

In the movement toward a more diversified farming in the plains states sweet clover has been seeded over large areas. The plant does well in this part of the country and withstands the drought of the summer months better than any other forage plant. According to the most recent estimates there is now available (1923) in the neighborhood of 140,000 acres of this well known honey plant in the state of North Dakota. Beekeeping in this area fits admirably well into the demand for a more diversified agriculture that has followed in the wake of the day when the whole country was one vast field of wheat.

By far the greater portion of this large acreage is the biennial white sweet clover. Some yellow sweet clover is seeded, but this is comparatively small in amount. The yellow sweet clover comes into bloom slightly before the white variety and is a welcome plant for the beekeeper at that time. Practically none of the annual sweet clover is grown.

Locations along streams, because of the necessity of pollen for spring brood rearing, are essential, especially since over much of this area trees are lacking. In the Red River Valley, elms and soft maples furnish both nectar and pollen in sufficient abundance to provide colonies with a good start in spring. In addition the luxuriant growth of dandelions that usually occurs in the Red River Valley enables bees

to build up strong colonies in ample time for the main honey flow from sweet clover.

Further west in the state, where trees are less abundant and spring flowers much less in numbers, there is likely to be a dearth of nectar in June, just previous to the main honey flow. On this account an abundance of stores must be available during the spring months until the sweet clover flow comes on. Fortunately the large amount of sweet clover in most of those areas, coming into blossoms late in the season as it does, usually makes up for any deficiency that may occur during the earlier part of the season.

According to the federal statistics for 1922 North Dakota produced an average of 157 pounds per colony, spring count, during the season. Present indications are that the production for 1923 will fall short of that high average, although a fair crop is reported by many of our larger beekeepers. My own impression is that the average for 1923 will be in excess of 100 pounds.

Reports from 35 beekeepers, obtained in 1922, indicated an average production for that year of 151 pounds a colony, an amount very close to the government figures. Individual beekeepers reported high yields, running up to 300 and 400 pounds a hive in many cases, depending on the region, availability of bee pasture and the skill of the beekeeper in handling colonies for honey production.

Especially in the Red River Valley are there large acreages of sweet clover. Reports from various county agricultural agents indicate that there are approximately 21,000 acres of sweet clover in Cass County, in which Fargo is located. Grand Forks County reported about 12,000 acres and Walsh County, immediately to the north from the last named, had some 13,500 acres. There are scarcely any beekeepers at all in Walsh County, although in Pembina County, still farther north and adjoining the Canadian line, are a number of successful men who keep bees. Richland County, in the southeast corner of the state, reports over 10,000 acres of sweet clover. All these counties are in the Red River Valley.

It may be interesting to note that what is generally known as the Red River Valley is not a valley at all, but an old lake bed. The true valley of the river is often less than a mile in width, since the stream is, in a geological sense, a young river. Most of this territory lies in the bed of old Lake Agassiz, an enormous lake of some 110,000 square miles in extent, an area one and one-half times that of the whole state of North Dakota. Geologists tell us that this great lake existed some 20,000 or 30,000 years ago, formed on the recession of the great ice sheet that one time covered much of the states of Minnesota and North Dakota. Lake Agassiz was far greater than any of the present Great Lakes and drained at one time into the Mississippi valley, even though the present Red River which traverses the old lake bed drains into Hudson Bay.

Although beekeeping in North Dakota seems to have been most successful in the Red River Valley, it is by no means restricted to that area. In Stutsman County, some 100 miles west of Fargo, are a num-

ber of successful beekeepers. One of these, the president of our State Beekeepers' Association, reported an average of 300 pounds of honey per colony in 1922. This man had 200 acres of sweet clover on his place that year.

West of the Missouri River in the state are practically no bees at all, except for those close to the river and in the Yellowstone Valley in the northwest portion of the state. Sweet clover grows readily along the Missouri River, but there are no great areas in those counties west from the river. With the introduction of sweet clover in this area, it seems probable that beekeeping may become profitable, although locations would have to be chosen with great care. The limited amount of rainfall in western North Dakota has been a handicap to the steady development of that region.

Along the Yellowstone Valley in North Dakota there is an irrigated area where beekeeping has become quite profitable. Much of this area extends into Montana. Alfalfa and sweet clover are the main honey plants in this irrigated section.

Cellar wintering is the rule in this section of the country. Although the winters are long and severe, some of our beekeepers have been very successful in carrying their bees through the winter. Probably the most important factor in the wintering problem in North Dakota is the high quality of available stores. With alfalfa and sweet clover stores on which to winter, little dysentery develops, and bees usually come through the long winters in fairly good shape. Bees are taken into winter quarters early in November, and come out some time in April.

Winters are long and cold. The snow comes on around the first of December and covers the ground until spring. Because of the steady cold weather, bees are likely to remain quiet in the cellar, and rarely give trouble until spring. The alternate freezing and thawing characteristic of more southern latitudes rarely occurs. Although severe cold weather often occurs in winter, still after spending ten years in Iowa, my impression is that the cold months are not much more severe than many Iowa winters. Those in North Dakota are more protracted and the blizzards more frequent than in Iowa. It is sometimes said, with much truth, that only three seasons occur in this part of the country; winter, summer and fall. The winter hangs on for so long a period that there are but a few spring days, and one is in the midst of summer. On the other hand, the fall months are usually mild and pleasant.

Last winter bees were successfully wintered outside in a quadruple case at the college apiary at Fargo. In this case the protection from wind was exceptionally favorable and the snow drifted in around the case high enough to be level with the roof, and so gave abundant protection throughout the winter.

North Dakota beekeepers obtained the passage of a foulbrood law at the last session of the legislature that requires every package of live bees or brood entering the state to be accompanied with a valid certificate of freedom from disease signed by the proper state official.

There is very little foulbrood in the state and everything is being done that can be done to keep out further importation of disease. It is my impression that our beekeepers have no serious objection to others entering the state, but they do insist that they bring with them a clean bill of health. More than one case has come to the attention of the state bee inspector where outside beekeepers have been unable to obtain proper clearance papers on account of American foulbrood. Those who have had experience with American foulbrood in other states realize the necessity of stringent measures in dealing with that disease.

Because of the relative freedom from disease increase by means of package bees has been encouraged. The 2-pound packages have done exceptionally well in this latitude, building up to strong colonies in ample time for the main honey flow and producing a good surplus the first year. In fact, package bees often out-stripped the full hives that had been carried through the winter.

Up to the present time practically all our honey has gone to local markets, mainly to the larger North Dakota towns, and to those nearby in northern Minnesota. Smalled amounts have been sent to the St. Paul and Minneapolis market. The time has come, however, when our beekeepers will need to ship considerable honey out of the state in large quantities. Definite efforts on the part of our beekeepers will be necessary to encourage greater consumption of honey.

The prospects for the business of producing honey in this area are indeed bright. To the man who studies his bees and his location and who can combine his ability as a beekeeper's with considerable business sense, there is an opportunity in this North country that can scarcely be equalled.

HOW TO GROW HUBAM CLOVER.

(By Edw. A. Winkler.)

There are two ways of seeding biennial sweet clover. One is to seed the sweet clover alone in the spring of the year and the other is to seed it with a small grain crop as a nurse crop. The object of seeding with the nurse crop is to cut the nurse crop off as a seed crop and use the sweet clover in the fall for pasture purposes, but where immediate pasture is desired, the biennial sweet clover should be seeded alone.

Seeding Sweet Clover Alone.

The object in seeding sweet clover alone is to give the sweet clover all the growing advantage possible. Sweet clover, when it is quite small, is a slow growing crop, the root system growing and the tops apparently standing still. Sweet clover that is seeded by the first of April, can be turned out on by the first of June and if weather conditions are ideal, it can even be turned on a little sooner. On driving through the county we occasionally hear advocated advising men to seed in some small grain crop where they desire immediate pasture results. I wish to advise that this method of seeding is absolutely wrong if you expect to get the best results. Oats or barley for instance will grow much faster than sweet clover on the start. Consequently, the oats and barley will push up and check the growth of the sweet clover. Then when the stock is turned on, they will eat off the small grain and will leave the field covered with small spindley sweet clover plants. Thus you will struggle along through the summer with a stand of sweet clover that cannot give the amount of feed that it could if it had been given a better start. Leave the oats and barley or other small grain out. Do not mix in any other clover or grass—seed to sweet clover alone.

Will Grow Faster.

After the sweet clover gets started it will grow faster than any other of the legume crops that we have and if the other legume crops are seeded in this, stock will leave the sweet clover and eat the other legume, so that in the fall of the year you will have a field with scatterering sweet clover plants standing up two or three feet high, which the cattle are using for fly brushes and which they will not use for feed.

Sweet Clover With Nurse Crop.

When seeding with a nurse crop for fall pasture, do not seed the small grain too heavy because it is apt to smother out the sweet clover plants and you will not secure the pasture that you desire. Sweet clover that is seeded with a nurse crop, where the nurse crop is not seeded too heavy, will furnish pasture in the threshing season and the next year to the last of August. We expect either one of the methods of seeding, where a good stand had been secured, to pasture 1½ to 2 head per acre, during both years of pasture.

Rules of Sweet Clover Pasture.

1. Seed alone for immediate pasture results.
2. Do not seed less than 15 pounds of scarified seed and not less than 18 pounds of unscarified seed to the acre.
3. Inoculate seed before seeding, being careful not to expose the inoculation to the sun.
4. Seed on sweet soil. Money and seed are thrown away when seeded on acid soil.
5. Seed as early in the spring as possible on well worked soil.
6. For best pasture results, keep sweet clover eaten down to within about 3 or 4 inches of the ground.

Seeding Hubam clover alone either broadcast or in rows is not near so profitable as seeding it in a nurse crop of grain. Hubam should be sown as early as possible in the spring. We prefer to broadcast it here on winter grain before the ground can be worked in the spring.

On one of our fields here the past year Hubam scarified seed was seeded April 9th on a good stand of winter rye, at the rate of 12 lbs. per acre. Owing to inclement weather, the grain harvest was considerably delayed so the farmer hauled the rye out of the field in order to save the rye. The Hubam at that time was nearly 3 feet high.

Atmospheric conditions due to inclement weather during the Hubam bloom was the cause for a short Hubam seed crop in Will County the past year and as a result many farmers were unable to get a seed crop, for instead of the many seed racemes hanging full of seed there were only the bare seed stems showing a lack of polination. This particular field was in a lower land, well protected and with one of my 16 outyards just over the fence. As a result a fair to good yield of seed was harvested.

If in doubt as to whether your land is acid, send a sample of the soil (about 3 teaspoonsful) to your State University, Dept. of Soil Improvement and ask them to test it for acidity and advise as to the amount of crushed limestone per acre necessary to neutralize the acid.

Few people are acquainted with the activities or Bacterial elements of the soil. It has been said that legumes are the only plants that have the power of removing free nitrogen from the air and storing it in the soil. Nitrogen is not only necessary for the production of large crops of grain but is also important in producing higher quality grain.

The bacteria which are present in the small nodules on the roots and lateral shoots of sweet clover and which are the deposits of nitrogen

placed there by the plant in extracting it from the air, are lazy, and can well be likened to the busy bee who when she gets the hive filled, often stops working.

The fact has been proven that after a soil becomes so rich or full of nitrogen up until a certain amount, another immediate crop of sweet clover will add very little more nitrogen to the soil, the plant then extracts no nitrogen from the air and the bacteria lie almost dormant. The more depleted a given soil is at the time sweet clover is sown, the more nitrogen in pounds the crop will add providing it be properly inocculated.

I saw and pulled up stocks of Hubam last December that had been grown along a new clay and limestone filled road on the outskirts of Minneapolis. This had been broadcasted there by a local beekeeper one

Hubam in shock following rye.

night in March, 1923, and showed a vigorous growth, some stalks four to five feet tall. A good setting of seed had set although the highway officials had cut considerable of it down. Many seed racemes were still full of seed the 10th of December.

The reason for small yields of grain is not due to the lack of better varieties of wheat, corn, or oats but in most cases is due to the non-availability of organic matter and nitrogen.

The Iowa State Experiment station which I firmly believe is far in advance in sweet clover propagation experiment and legume research work has done much in the past years in trying to find a legume to fit the soil instead of fitting the soil to grow the legume and makes the statement that where one can grow Hubam, it is the best legume crop.

There seems to be still a lack of knowledge regarding the characteristics of Hubam clover in that Hubam is an annual clover and if seeded in the spring of the year, will bloom and set seed the same year.

If sowed too late in summer to set a seed crop, it usually winter kills.

The best nurse crops to sow Hubam in are in the following rotation: Winter wheat and rye, spring wheat, Kursian oats, Iowa No. 103, Iowa No. 105. Barley is better than the average oats while silver mine or big 4 are both poor varieties of oats to use as a nurse crop.

We have found that lime is the most essential element in procuring a successful stand and crop of Hubam. Our observations the past year tend to show that Hubam is more resistant to acid and will thrive better on a soil charged with acid than the biennial strain of sweet clover.

Phosphates are coming to be used more the past two years than before. This in a large measure is due to Farm Bureau advisors who are advocating rock phosphate application, on lands depleted in phosphorous.

During the past season I had the privilege of carefully watching one of the combination thresher and hullers while in motion.

This machine was a new one last spring and I have yet to see a cleaner do a more economical job of clover hulling than that machine which is built into a combination, allowing a farmer to grow a very small acreage of clover and have it hulled with the same setting with his grain. The machine can be changed from a grain separator into a clover huller inside of 15 minutes.

It is the coming machine for it will enable a farmer to plant a small acreage of clover with the assurance of getting it hulled economically and at a profit. It is made by the Illinois Thresher Co., Sycamore, Ill., and is the only huller I have yet seen with a large straw rack room, suitable to handle large, coarse sweet clover stocks with rapidity.

On a field that was given an application of two tons of limestone per acre and half of the field an extra application of acid phosphate at the rate of 50 lbs. per acre (approximately 53 cents worth) resulted in only a fair stand on the limed area, whereas a good to perfect stand was secured on the lime and phosphated area.

Experiments conducted here the last year with cherokee, a new discovered legume was a failure as was also a planting of Dalea or Woods' clover. Neither legumes set seed, although some of each was grown under cultivation and under proper methods and conditions. Neither of these new found legumes are nectar bearing.

One field of Hubam that had produced a good crop of Hubam seed in 1922 was disked up and put into winter wheat, the fall of 1922. The spring of 1923 showed an excellent stand of young Hubam plants germinating from the shattered seed of the 1922 Hubam crop, but believing the wheat stand insufficient it was redisked and seeded to barley. A good stand of Hubam was cut for seed last fall following the removal of the barley.

Poor results were obtained from a Hubam stubble of 1922 where winter wheat was drilled in on the stubble without disking previously.

One field of gravel and sandy soil was shallow plowed in the fall of 1922 following the removal of a fair crop of Hubam seed and winter wheat disked in. No Hubam was sown with this wheat but a good stand of Hubam was turned under this past fall following the removal of the winter wheat.

Practically no signs of volunteer Hubam is found after the first cultivation of corn where the field has been in Hubam the year previous.

A few farmers experimented with Hubam the past year by occasionally throwing in a handful of Hubam seed in the hopper while planting corn.

The corn averaged 6 feet, while the Hubam, even though the corn had been blind cultivated, averaged over 3 feet high and heavy with large green seeds on at silo filling time.

Winkler showing 4 square feet of Hubam following Barley. Notice how heavy and lodged the stand is. This growth turned under would put 1,200 pounds of extra available nitrogen per acre.

I have found that the best way for me to grow Hubam is to let the farmer grow it.

Furnish him the seed, all the necessary knowledge and advice in growing and harvesting the crop. Many fields last fall I advised the farmer to either plow under or cut for feed when I saw there would not be a sufficient setting of seed to let the stand mature, so it is better for us to specialize and concentrate our attention on our apiaries after we have the farmers all set, and devote the winter months to the promulgation and promotion of legumes and more legumes for I feel that with our high priced lands, this propaganda will never be overdone.

Practically every failure in procuring a good stand of Hubam the past year that has come to my attention has been traced to a failure to apply limestone.

SOME WHYS OF THE WINTERING PROBLEM.

Points to Be Emphasized in Good Wintering.

(By G. H. Cale.)

There are several easys roads to a lively dispute at any beekeeping convention, but I believe one of the easiest of all is to open a discussion of the wintering problem. Although in the last few years, a few fundamental principles of good wintering have been established, the application of them has resulted in a great variety of methods and materials which are confusing and whose application is clouded by vagaries of all sorts.

Articles have appeared in the journals, each fall, by authorities on wintering, which detail the essential features of the subject in an exact way. These fundamentals should now be so thoroughly soaked into the mental equipment of a successful beekeeper that any further extended reference to them would be rehash and would serve no purpose but to disturb his good nature.

Factors in Wintering.

The bulletins published by the Department of Agriculture, available without cost to any beekeeper applying for them, are most excellent texts on the wintering of bees. I have read them several times and, at each reading, find there is some point which I have failed to appreciate before. We need more such publications from Uncle Sam's laboratories.

The work done by Demuth and Phillips on the wintering problem threw some interesting light on the way bees react to winter conditions. Probably the determination of the temperature range for successful wintering was the most important phase of it. Their work determined the following important facts: (1) That bees winter in a shifting cluster which contracts or expands in direct relation to the temperature surrounding the bees, and that the continuance of warmth within this cluster is the result of activity on the part of the bees themselves. (2) That, at a temperature of approximately 57 degrees Fahrenheit, bees are apparently the quietest and the cluster produces little heat. This temperature, therefore, is an optimum one for wintering bees. At colder temperatures, the bees condense their cluster and produce heat, and, at warmer temperatures, the cluster tends to break and the bees finally fly out of the hive. (3) Their investigations, incidentally, determined the fact that bees, wintering on a perfect carbohydrate, react differently to temperature than those which winter on a carbohydrate

containing quantities of indigestible matter. A high grade honey is therefore better for wintering purposes than a honey containing honeydew or other indigestible material. Bees wintering on poor stores tend to keep a higher cluster temperature and a greater cluster activity than those which winter on good stores. This often results disastrously unless other conditions are the very best.

Applying the Facts.

From these facts, wintering would seem to be an easy problem. It is implied that it is only necessary to keep bees at a temperature of 57 degrees, constantly, on a pure carbohydrate, and they will winter without loss. This, indeed, is an exact interpretation of the facts, but attempts to bring about the necessary conditions have resulted in a great variety of systems and methods.

It is a peculiar human trait to misunderstand and misapply some of the simplest facts of scientific determinations. As a case in point, during a trip through Wisconsin, some years ago, I learned of a beekeeper who had been told by one of the Government extension workers of the discoveries that had been made in wintering bees. This man was particularly impressed by the fact that 57 degrees had been found an optimum temperature for wintering. Since most of the facts were related to him in conversation, he mentally arranged them in the order of importance which seemed most correct to him, and determined upon the temperature relation as being the one most important consideration.

He had much faith in what the agent had told him and in the experimenters who had so faithfully studied the subject. Therefore, the following winter, he placed his bees in a cellar and very carefully kept the temperature of the cellar as near the optimum 57 as he could. The next spring his bees were practically all dead. Needless to say, he was not only at great loss, but in an unreasonable mood towards those who had determined such beekeeping facts. He blamed everybody and everything but himself. He was perfectly honest in the whole matter. Others, perhaps, have been through a similar experience.

Since it must be admitted that these scientific determinations are correct in principle and have been proven to be so by numerous tests, why is it that an application of them often apparently fails? There is no single answer to this question although the answer is most always a simple one. Some essential in the application of the facts to practice is omitted and the omission so alters the behavior of the bees that wintering results are disastrous.

In trying to apply the temperature facts to the practice of cellar wintering, it is a mistake to keep the cellar temperature at 57 degrees. It is thought that this is the correct application of the fact discovered by science. A close analysis shows it is an error.

Science declares that bees winter best apparently at an optimum temperature of 57 degrees. What does this mean? It means that the air *surrounding the cluster of bees* should be somewhere near 57 degrees, *provided* the stores on which the bees must live are of the best and the bees themselves are in good condition. If these latter factors are not

present, 57 degrees will not be an optimum temperature for that particular colony. In keeping the temperature of the *cellar* at 57 degrees, one does not necessarily keep the temperature of the air *surrounding* the bees at 57 degrees. With the cellar temperature at that point thermometer placed near the cluster of bees would probably register considerably higher. In applying the scientific facts to the practice of cellar wintering it is well to follow the simple rule of Langstroth: "Keep the cellar temperature at that point where the bees are quietest." It will be found that the temperature of the clusters, in a properly managed cellar, is somewhere near 57 degrees, although the temperature of the cellar itself may be considerably lower than this.

Outdoor Wintering.

In any discussion of outdoor wintering much stress is laid on the importance of packing bees to protect them from outside temperatures. In fact, so much stress is laid on this point that there is a tendency to lose sight of factors which are of equal and often of greater importance. In the Dadant apiaries we have not yet been able to prove to our satisfaction that heavy packing or insulation in large packing cases is a profitable method of wintering for us. We still protect our colonies in winter with a net of leaves or straw surrounding them, with leaves or straw in the covers placed over the clusters. The south or front sides of the colonies are left unpacked. While we have not yet proved the feasibility of heavy packing for ourselves, we have been in places where it is used with great success, even as far north as northern New York and southern Ontario. In our own climate we have flight days two or three weeks apart, at the worst, and, in the few instances where heavy packing has been used, more loss has been suffered by those colonies than where the leaf or straw packing was used. Probably this was due to some condition which we have not carefully studied.

In outside wintering, it is often recommended that sealed covers be used over the hives. While this recommendation has a good basis in fact, it is nevertheless a dangerous one. If the winter stores are of the best quality, the clusters strong and sufficiently protected by packing and windbreaks, a sealed cover will prove better than upward absorption. However, I have yet to find a method which will sufficiently determine for me the exact quality of the stores in all of our colonies, or which will predict the conditions under which the bees will winter, to feel that sealed covers are safe. Consequently, we always provide for upward absorption.

Stores.

However important the matter of packing and cover may be, it is my opinion that they are greatly over-emphasized. The most important factors of successful wintering are good stores and good colonies. The word "good" is an ambiguous one, and yet I do not know of any other word to use. By good stores is meant stores which are thoroughly digestible. It has been found that when quantities of indigestible ma-

terials are retained by the bees in winter an irritation is produced which tends to increase the cluster activities, and consequently the cluster temperature, in proportion to the amount of waste materials accumulated. In Canada, where bees are wintered successfully out-of-doors in large packing cases, it has been found necessary to extract the natural stores and to feed back sugar syrup, which is free from waste, in order to insure successful wintering.

It seems to be a natural provision also that the honeys of the northern states are of a better quality than those in the south, where bees have frequent chance for winter flights. In our region, which is just on the fringe of the clover territory, we do not have as good a grade of stores as they do a hundred miles or so north of us, and, when we get an occasional severe winter, we notice a much heavier loss, regardless of the condition of the colonies or the protection given them. We have come to look upon the amount and quality of stores, therefore, as one of the most important factors in successful wintering. In fall, if we anticipate a poor grade of stores, we often feed some sugar syrup, so that the bees will have good stores for the severer part of the winter.

In our own experience, we have found, regardless of the protection given, that those yards which are best protected from winds show the best wintering. I believe that if I had to do either without wind protection or without packing, I would choose to do without the packing.

Young Bees.

The importance of strong clusters of young bees has been stressed time and again, yet we have just been through an experience which has thoroughly impressed this fact upon us. For several years we have been having a severe fight with foulbrood, which, thanks be, we have now reduced to negligble minimum, and we have been in the habit of examining for disease three or four times a year. The last examination comes in the fall as we remove the fall crop. In the fall of 1921, after this examination, we had twenty cases of foulbrood scattered through our ten yards, and, preferring not to shake the bees so late in the season, we decided to isolate them in a hospital yard until spring. We gave this yard considerable care, packed it carefully for winter, and fed the colonies sugar stores, so they might have the best possible food for winter. However, of these twenty colonies, we had two left at the beginning of apple bloom in 1923. The explanation of this is simple. These colonies, badly diseased with foulbrood, although they were strong in numbers, were made up largely of old bees, due to the fact that the brood emergence had been so long at a low point. These old bees could not survive the winter. They died with the best of protection and with plenty of stores in the hives. Some of them had been requeened during the previous summer, but were not able to build up clusters of young bees for winter.

We have, therefore, come to regard a large number of young bees as necessary for successful wintering. I believe that a proper emphasis of wintering essentials, in most regions, would place stores and bees first in importance, and protection and packing last.

POLLINATION, WITH PARTICULAR REFERENCE TO THE BUMBLEBEE.

(By Theodore H. Frison, Natural History Survey, Urbana, Ill.)

It is but natural that beekeepers as a group should think in terms of the honeybee when the subject of bees in relation to pollination is mentioned. Though I do not intend to rob the honeybees of any laurels which they justly deserve, I do wish to point out that there are other bees which merit attention in discussing a broad general subject such as pollination. This is evident when we reflect upon the fact that at one time not so very long ago there were supposedly no true honeybees in North America, but many flowering plants dependent upon insects for their pollination flourished as well as, and many perhaps better than, they do at the present time. This clearly shows that pollination was at one time accomplished on a large scale by native North American insects.

Changes in the character of the country, due to our increase in population and present methods of agriculture, have upset much of this natural balance in nature. Many of the places where wild bees formerly made their homes have been so altered that it is impossible for these insects—with relatively stereotyped habits—to multiply and their numbers in many localities have steadily decreased. The same decrease is also discernible in the case of many of our native flowering plants. The necessity for pollination by insects has, nevertheless, not materially decreased. This is because of our large scale and intensive plantings of certain forms of plant life which contribute to the world's food supply or pleasure, and which when grown upon a commercial scale are still in need of pollination by insects. Even though the honeybees did not produce such valuable products as wax and honey, they would nevertheless exert a most beneficial and timely influence upon some of our agricultural activities at the present time.

Many years of observation by such students as Mueller, Sprengel, Knuth in Europe, and later Robertson, Trelease and Lovell in America, have demonstrated the complicated interrelations of insects and flowers. Some flowers are pollinated by but one kind of insect, others by many insects, and all sorts of varied interrelations exist. Preeminent all over the world among the insects as flower pollinators are the numerous kinds of bees.

I have just mentioned that the flowers of some kinds of plant life are pollinated by but one or a few kinds of insects, and it so happens that one of the important plants in our present Illinois scheme of agriculture is especially adapted to pollination by bumblebees, namely, the red clover. As you all know, the red clover is at times pollinated by

honeybees, but bees native to our fauna are its principal pollinizing agents. Several species of bees, commonly referred to as wild bees, frequent red clover and in many instances they are responsible for a profitable early seed crop. In the main, however, bumblebees by virtue of their structure and habits are our chief agents in the pollination of the red clover seed crop.

The relation of bumblebees to the setting of seed in red clover was early demonstrated by Darwin and his results in their essential features have since been confirmed. In order to give you some idea of the rapidity with which bumblebees work I will relate an experience of my own. One spring I observed a queen bumblebee at her labors for one-half hour. During this time she visited forty-two heads of clover. A count revealed a possibility of some 2,226 florets being visited. Even though half of these florets were not visited, we can gain from these figures some idea of how rapidly and how thoroughly the bumblebees work.

You are undoubtedly aware of the state of affairs which once existed in New Zealand. The colonists there introduced the red clover but it would not produce a seed crop. Seed had to be imported annually from a great distance and was naturally quite expensive. This led to an investigation of the cause of the failure of the clover seed crop in New Zealand. In that country there were no native species of bumblebees and in fact none on the nearby continent of Australia. Bumblebees were then imported from England. They became established and the red clover is now stated to produce a plentiful seed crop.

In this country we are fortunately endowed, as we are in so many other natural respects, with a large number of species of bumblebees. The number of these insects, so useful in our present scheme of agriculture, is decreasing. There is much evidence to indicate that honeybees alone are not fitted to replace the bumblebees in our red clover fields if we desire a dependable seed crop. Therefore, even leaving out of consideration all of the good done by bumblebees in pollinating the flowers of many of our other wild and cultivated plants, the bumblebees are deserving of a thoughtful policy of protection. Beekeepers, because of their profession and their understanding of the role bees play in pollination, are in a particularly favorable position to help spread information which will decrease the needless destruction of the nests of these important insects.

While studying various phases of the biology of the bumblebees the opportunity was presented for taking some moving pictures of bumblebee life. The bumblebees, as all beekeepers know, are close relatives of the honeybees. Since these pictures, besides showing the interesting life of these insects, deal directly with the important role that bumblebees play in the pollination of red clover and other plants, it has been suggested that I show them at this meeting. (Motion pictures then projected.)

ARE AREA CLEAN-UP CAMPAIGNS A SUCCESS?

(By S. B. Fracker, Read at the Miller Memorial Library Dedication Meeting.)

Two or three weeks ago I was foolish enough to engage in an acrimonious political discussion during which bitter criticisms were made of various recent presidents of the United States by different members of the party. If we were to judge Republican presidents by what Democrats say about them or Democratic presidents by the rumors persistently whispered by Republicans, we would reach the conclusion that the American people in picking a president choose the most dastardly criminal available.

The reason for these criticisms is because each person is comparing a prominent figure with an ideal, is judging a human being on the basis of a high imaginary standard to which we hope he will attain.

Bringing this illustration a little closer to our present subject, we might answer the question, "Are Area Clean-up Campaigns a Success?" either in the affirmative because the amount of bee disease is reduced or in the negative because American foulbrood so far has not yet been completely wiped out. In other words, if we judge the effectiveness of bee disease control methods by the imaginary standard of absolute freedom from disease two or three years after the campaign has begun, we must admit that so far such has not been the result and area clean-up campaigns have not brought that freedom from worry which was perhaps at first anticipated.

I think that we will all admit on the other hand that such a basis for judgment is hardly the correct one on which to answer such a question. For our present purpose I am assuming that what this audience is interested in is whether foulbrood area clean-up campaigns have resulted in reducing the amount of disease present, have prevented its spreading, have changed counties and townships from unprofitable beekeeping territory to areas in which honey producers can keep bees with some promise of success, and most important of all, whether any other superior plan of campaign has been suggested which can be substituted for the area clean-up method. After making a rather close examination of the subject on this basis I am personally convinced that this plan of handling bee disease control is not only a pronounced success, but is the only method which is even partially satisfactory for handling the problem.

Wisconsin has received so much advertising during the last three or four years on its bee disease control methods that I would prefer (if sufficient information were available) to improve our perspective by

getting away from this state and investigating the methods employed elsewhere. Wisconsin is neither the first state to try this system, nor is it perhaps the one in which greatest success has been met. Detailed figures regarding the various areas in other parts of the country are so difficult to obtain and published tables so hard to interpret justly unless one is familiar with all the circumstances that we shall be compelled to use the Wisconsin figures at least in part. If some attention is therefore paid to other states it is not because I do not have somewhat of a natural feeling of pride in the accomplishments of the fine group of inspectors who have been handling the work in Wisconsin.

The foundation of any plan for disease or pest control is knowledge of the distribution of the disease or pest concerned. As long as it occurs only in sporadic outbreaks the area clean-up plan as employed in Wisconsin is of questionable value unless it is adopted merely for the purpose of locating such outbreaks. If only one bee yard out of one hundred shows American foulbrood there must be of course some method adopted to locate that bee yard, but with a disease as virulent and as readily infectious as American foulbrood the only reasonable course to pursue under such conditions is destruction of the infected material root and branch. The same thing is of course true with human disease and cattle infections. The foot and mouth disease in cattle is probably no more severe than several other diseases which are present in the United States, but rather than add it to the troubles we now have, all the forces of the federal and state governments were directed to its complete eradication when discovered. The appearance of yellow fever, bubonic plague, and similar troubles in one of the ports of the United States would justify extreme methods of eradication even though other forms of human disease might be present in the same locality which were even more injurious. I feel, therefore, that Florida and I believe one or two other southern states have been entirely justified in adopting instead of a general area clean-up policy the complete destruction of each center of infection that they are able to discover in place of the persistent, remorseless stick-to-itive-ness which has characterized the work in the Mississippi Valley states where progress is being made in the control of bee diseases.

Two of the states in which remarkably successful bee disease control work has been carried on are Texas and Indiana. While widely different in geographic location, apicultural methods, and in the personality of the beekeepers they are alike in the fact that other nearby states have not adopted similar methods and are now paying the penalty. The organization in both states is almost identical with that of Wisconsin. Apiary inspection is in the department of agriculture and is under the direction of the State Entomologist. The Chief Inspector devotes all of his time, at least during the inspection season, to administration of inspection work, but most of the work is done by a considerable number of local inspectors who are locating each beekeeper they can find in the area in which they are working. Five years ago while Wisconsin was still talking about area clean-up methods, Texas had already secured excellent results along those lines and some coun-

ties in which bee diseases had formerly been serious or rampant were even then believed to be entirely free of disease.

In Texas the situation is complicated a little by the large number of queen rearing and bee breeding apiaries which require inspection certificates. This necessitates considerable investment of time and money in the inspection of these large yards which ship bees to the northern states. As a result a somewhat smaller portion of the inspector's time can be given to the clean-up work. The actual number of colonies of bees inspected in Texas is much greater than that of any other state of which I have been able to get figures, amounting to between forty and fifty thousand per year as compared with thirty thousand in Wisconsin and about twenty thousand in Indiana. The queen breeders located mainly in parts of the state which are free from disease represent about one-third of this amount. However, their work there, while laborious, is hardly comparable with that which must be done when bee disease is present. In a recent report on this subject, the State Entomologist of Texas reports that out of forty-five thousand colonies inspected in the twelve months ending about a year ago, six hundred eighteen were found infected with American foulbrood and of these five hundred forty-one colonies were destroyed. In that state treatment is permitted if the beekeepers prefer it, but except in yards where the infection is rather wide spread it is discouraged as much as possible, and destruction urged in its place. They feel that by following this policy they will be able to completely eradicate American foulbrood in Texas in the not very distant future.

The results of the county-by-county method of dealing with bee disease are also remarkable in Indiana. The inspection force there is efficient and they are taking a few counties at a time and keeping at them until the results are worth while. In a recent published report, for example, it is stated that in Lake County which adjoins Chicago, the first inspection in 1918 showed 23% infected with disease. In 1919 this was reduced to 14%; in 1920 to 4%; and in 1921 to only 2%. Lake County beekeepers now know that brood diseases can be controlled although four years ago some of them were skeptical as to what the result would be.

In Newton County, Indiana, the figures follow a similar percentage—23% of the colonies diseased in 1918, were followed with 10% in 1919, 4% in 1920, and 2.8% in 1921.

By maintaining a constant appropriation of about $10,000 a year for the past six years, Indiana has been able to show a more constant apparent rate of progress than Wisconsin. The percentage of disease has gradually gone down from 15% in 1918 through 10% and 6%, to 4½% in 1921 at the time of the last report. The apparent improvement in Wisconsin is not quite so great because each year we have taken on new counties, the heaviest centers of infection not being reached until this year.

Our Wisconsin figures have been presented so many times and in so many different ways that it seems needless this time to go over the complete record. Regardless of our most active work, we are still hav-

ing trouble cleaning up the larger commercial apiaries. I sometimes believe that the more a man knows about American foulbrood the more likely he is to retain it in his bee yard throughout his entire life. This problem has been especially serious in Richland and Manitowoc counties where some beekeepers have become used to foulbrood and are succeeding in keeping bees in spite of it.

Nevertheless the progress in the various clean-up areas has been excellent. Fond du Lac has been going down from a condition in which 40% of the apiaries were infected through 20% last year until this season Mr. Schultz is finding only about thirty-four out of the 440 bee yards in the county showing any disease whatsoever. The colony percentage has been reduced from 8% to 2%.

In our old offenders, such as Jefferson and Milwaukee counties, there are still a dozen old offenders hanging on in each place in spite of persistent effort, but the proportion of diseased colonies is less than 2%.

One more factor needs to be taken into consideration in interpreting the figures as they are published in biennial reports. In spite of the fact that we have been using the term area clean-up or county clean-up method for a number of years, it was only last season that we began covering the entire county. For example, in Jefferson County the whole northwest district from Lake Mills through Waterloo and the southeast district from Sullivan to Palmyra was omitted, our attention being given to the wide heavily infected strip throughout the county. Last season, which was the first year we had sufficient funds with which to work, these other areas were explored and it was found that there were a number of infections in the northwest and southeast sections.

There has been a similar experience in Richland County. A survey which an army would call a reconnaissance trip was made throughout the northeast two townships and no disease was found, and it was, therefore, assumed until last year that this area was clean. A careful farm to farm inspection made through these townships last season showed a number of beekeepers about which we had no information, and one section particularly which was 100% diseased.

In spite of these complications, in spite of the obstacles of cleaning up large yards where the honey is on all the tools and on all the equipment, in spite of having to deal with little beekeepers, big beekeepers, men who are entirely familiar with foulbrood and who have been breeding it for years, men who are anxious to clean it up, and men who are too afraid of material; in spite of working in localities where practically all the honey on the market is infected and whatever it is exposed to, results in infecting some bees; in spite of the inspectors often being completely balked by commercial bee men who seem to insist on pulling out infected frames, concealing disease from the inspectors, being careless with infected material, and feeding infected honey to their colonies; in spite of all these obstacles the number of infected apiaries and the number of infected colonies in the state of Wisconsin is now steadily decreasing. I hardly know whether to be as

optimistic as Doctor Tanquary, the State Entomologist of Texas, and express a hope that by following the present policy we will be able to eradicate the American foulbrood from the state in the not very distant future, but I am willing to say this—that this year we have entered the last extensive American foulbrood infection center, namely, the belt through Ozaukee, Washington, and Dodge counties, and that if the beekeepers continue their active co-operation and support, there never again needs to appear on any apiary inspection record anywhere near as many cases of American foulbrood as were shown on last year's records. In other words, I believe that the peak has been passed, that the most serious obstacles have been encountered and that the outlook for a definite proof that American foulbrood campaigns on the area clean-up basis are an unqualified success is greater than it has ever been before.

THE RELATION OF BEES TO SPRAYING.

(By W. A. Ruth, Department of Horticulture, University of Illinois.)

The honey bee is undoubtedly the most active agent in the pollination of fruit trees. Other insects are of minor importance and wind is not an agent, unless we include the nuts, which are wind pollinated. Just how necessary it is or may be under certain circumstances to provide artificially for pollination by the introduction of stands of bees into the orchard is not the purpose of this paper; the fact remains that orchardists have occasionally recognized or believed in such a necessity. On the other hand, the great majority of orchardists are not sufficiently interested in pollination to look upon it as a matter which will not take care of itself. This being the case, the importance of bees, the possible desirability of actively encouraging them, and even the desirability of not destroying them, is in danger of being forgotten if it is necessary to spray with such materials, or at such a time, as to kill them in order to control some injurious insect or fungus.

There are two classes of sprays which are invariably applied to apple trees near the blooming period. These are the fungicides, which are applied to control apple scab and blotch, and the insecticides for such chewing insects as the codling moth and curculio. These two classes of sprays are to be differentiated by the beekeeper as well as by the orchardist. The fungicides are primarily plant poisons. They are copper compounds, the principal one of which is Bordeaux mixture, or sulfur compounds, the principal one of which is lime sulfur. It has never been shown, and there is no reason to think, that copper or sulfur compounds are toxic to insects, either to the codling moth, curculio, etc., or to the bees. As far as we know, the beekeeper has no occasion for alarm when the orchardist applies a fungicide, even if he applies it when the bees are actively working.

It has been shown experimentally, however, by feeding experiments, that arsenicals, contained in the other class of spray material, may be toxic to bees. The important points in this particular connection are two, as follows: (1) are arsenicals applied in commercial practice at a period when they might injure bees, and (2) if arsenicals are applied at such a time are the bees actually injured?

To be injurious to bees, it would seem that arsenicals must be applied to the flowers, that is, to the opening or opened flowers before the bees visit them. The writer supposes the injury to bees would be much more likely to follow the application of an arsenical to the nectary than its application to other surfaces, but does not mean to imply that the possibility of injury from the latter source is wholly excluded. Applications to the open flowers after the bees stop their visits can do

the bees no harm, and certainly arsenicals applied to the outer sides of the calyxes and petals of unopened flowers are not to be looked upon as a possible source of arsenical poisoning through the nectary. The arsenical, once it has dried, stays where it is, because of its insolubility and adhesiveness, and if applied to unopened flowers, has no tendency to reach the nectary or other inner surface of the flower. Because it wets the surface with considerable difficulty, the spray has, in fact, a strong tendency to recede rather than to spread.

The spray schedule recommended for apples in this state calls for an application of spray immediately before the petals open, and for another immediately after blossoming, starting when three-fourths of the petals have fallen. Both of these applications call for the use of lead arsenate. The question in which the beekeeper should be interested primarily is this: As spraying is done in commercial orchards, is the first of these sprays ever applied to opening flowers, or even during the period of full bloom, and is the second of these sprays ever started too early, i. e., before the flowers have lost their attractiveness? From his observations in commercial orchards in this state the writer has occasion to believe that in most cases the sprays are put on at the time recommended. Recent conversations with others who have made a similar sort of observation also lead him to believe that the recommendation to start the second of these sprays when three-fourths of the petals have fallen is probably conservative from the beekeeper's standpoint. According to these observations, bees rarely visit apple trees on which the flowers have reached this stage of development. However, this is a point which requires more study. Moreover, because of insufficient apparatus or unusual seasonal conditions there can hardly be a doubt that the pre-bloom application of spray is occasionally prolonged until a considerable part of the flowers have opened. It should be stated also that sprays are applied occasionally to certain late blooming varieties when they are in full bloom. This spray is to control apple scab, and requires only the fungicide.

This brings us to the question of the injury to bees produced by arsenical sprays applied during the period when the maximum injury can be expected, that is, when many of the flowers are opening. The infloressence of the apple is a cyme, which is a convex or flat flower cluster whose central or terminal flower opens first. If weather conditions are favorable, the others in the cluster soon follow, several of them often opening nearly together. If weather conditions are unfavorable the flowers follow each other more slowly and the stage bloom is delayed. Several experiments have been carried out in which arsenicals were applied when the apples were in or approaching the period of full bloom. One of the earliest investigations was made by an entomologist[1] in Ohio in 1898. In this work Paris Green, the arsenical in use at this time, was applied at the customary strength. The results of four experiments were for various reasons considered inconclusive. The results of a fifth, which consisted in the analysis of bees dead from no other

[1] Spraying with Arsenates vs. Bees, F. M. Webster, Ohio Exp. Sta. Bul. 68: 48-53 (1898).

apparent reason, were considered by the experimenter to be positive, although the fact that the report does not state that the bees were actually observed visiting the sprayed flowers appears to leave the results open to question.

Another report of work along this line is from a California entomologist.[2] This experimenter, after stating the apparent necessity for spraying in the Pajaro Valley during the bloom, evidently because of the peculiar local growth habits of the apple cluster, concluded that there was no experimental evidence to justify the general fear of spraying at that time. In conducting his experiment a healthy hive was placed in the center of a 40-acre apple orchard "just before spraying with an unusually heavy dose of arsenicals as the trees were just coming in full bloom." These arsenicals were evidently lead arsenate and zinc arsenate. The data are not as complete as might be desired, but the conclusion is drawn that "when the more soluble arsenicals (Paris green, etc.) were in use, there is reason to believe that many bees were killed, and even with the insoluble lead or zinc compounds now in use a small percentage evidently die of the poison. Even under the severe conditions of the excessive dose and a locality where practically all the food was from sprayed trees there was no appreciable danger to man from poisoned honey."

Another and much more extensive piece of work was published at the Indiana Station[3] in 1920. It was shown that the bees did not avoid sprayed trees; bees collected from such trees and caged five hours gave a strong reaction for arsenic, and practically all of them died. Bees kept in large cages enclosing sprayed trees, containing also the hive, died in large numbers. The mortality in a lime sulfur lead arsenate sprayed cage was sixty-nine per cent, in a sulfur lead arsenate dust cage forty-nine per cent, and in a cage enclosing an untreated tree nineteen per cent. The conclusion drawn is, that for the sake of the bees, fruit trees should not be sprayed while in full bloom.

The conclusion of the Indiana entomologist was positive. After the publication of this work the results of further work in Pajaro Valley[4] were published, which again contradicted the Indiana conclusion.

The experiments were, in brief, as follows: A tree was sprayed heavily when almost in full bloom with a spray containing three pounds of arsenate in 50 gallons. The tree was then enclosed in a cage and a strong colony of bees was set under it. The next day the tree was sprayed a second time. The bees visited the sprayed flowers freely. They appeared to be acting normally. Two days later the hive was returned to the apiary and examined by the entomologist and the owner and appeared to be entirely uninjured. The bees had been storing honey during the two days that they were in the cage, and nothing unusual was to be seen. The hive was watched during the following year and no unusual conditions were noted. A duplicate test started five days later gave the same results.

[2] C. W. Woodworth, Cal. Agr. Exp. Sta. Rpt. 1913-1914: 111-112.
[3] W. A. Price, Bees and Their Relation to Arsenical Sprays at Blossoming Time, Ind. Agr. Exp. Bul. 247, 1920.
[4] Bees vs. Spraying, R. W. Doane. Jour. Econ. Ent. 16: 527-531, 1923.

The above experiments were carried out in 1919. It was followed by further experiments in 1920. This time 4 to 6 pounds of lead arsenate were used in 50 gallons, together with Atomic Sulfur, or dry Bordeaux mixture. Acid lead arsenate was the arsenical used in at least a part of the experiments. This time, the hives were not enclosed in cages, but were set under blossoming apple trees, which were sprayed thoroughly.

"When I began spraying", the California writer states, "the bees from the hive were feeding on the blossoms in great numbers; most of them were driven away by the spray material but within ten minutes of the time the spraying was stopped a number of them were back on the tree again, so their feeding was interrupted for only a short period. The day was sunny and warm, although a slight breeze was blowing intermittently * * * During the next ten days I watched the bees and the trees very carefully and then took the colony back to the apiary whence it came. During the time the bees were in the orchard no unusual condition developed. The bees had been working actively and while a few dead bees had from time to time been found on a cloth spread outside the hive, the number had not been more than one would expect to find around a hive at this time of the year. An examination of the hive at intervals after it was returned to the apiary showed that the bees and brood were in good condition and that the bees had stored a good deal of honey during the time they fed in the small apple orchard."

The California experimenter goes on to say that it is a common practice among the beemen of the Santa Clara Valley to lease their hives to orchardists for the blossoming period and that no restrictions are made as to spraying. No bad results have been observed in the Pajaro Valley, where every opportunity, because of peculiar spray schedule, is given for the bees to feed on poisoned blossoms.

In conclusion, the California entomologist states that "A real California booster would say, 'It's the climate!' Possibly it is."

With the widely differing reports at hand from Indiana and California what is the Illinois beeman to believe? One would be inclined to take the Indiana results, because the Indiana climate is similar to ours. It can not be denied, however, that the California results cast a doubt upon their conclusiveness. Such an extreme difference, it is true, may be the result of climatic differences. On the other hand, differences in experimental method may be involved.

It would seem to the writer that the following points especially can be studied by Illinois beemen:

(1) How commonly is the pre-bloom spray applied to opening flowers?

(2) In case the pre-bloom spray is applied to opening flowers does injury to the bees appear to follow?

(3) Do honeybees visit the flowers after the calyx spray is applied? (I believe that this application is ordinarily made after the bees have quit visiting the flowers, but am not fully satisfied that this is the case. Beemen especially, and commercial orchardists also, should

take pains to note this point. Let us state again that in Illinois we do not recommend the application of an arsenical during the blossoming period, although a fungicide may occasionally be necessary.)

(4) If bees visit the flowers in any number at this time, is there a high mortality in the colonies?

Finally, since the matter does not seem to be settled one way or the other, the orchardist should leave the arsenical out of his spray if he sprays during full bloom.

Other fruits than the apple are not, according to our present practices, sprayed at periods which appear to be dangerous.

WHEN ILLINOIS HITS HER STRIDE IN APICULTURE.

(By Wallace Park, Division of Apictulture, University of Illinois.)

As a newcomer in Illinois, I have been struck by the great possibilities for beekeeping here. But the records of honey production indicate that those possibilities are not fully used. The situation reminds me of an untrained track aspirant who has the build of a runner and shows some speed, but who maintains no definite stride and seldom wins a race. Obviously, what this runner needs is training which will enable him to "hit his stride" and keep to it.

Illinois has the build of a honey producing state of the first order. Her size, her climate, her honey flora, the number of colonies of bees and the honey crops produced occasionally, all indicate her possibilities in this line. In the matter of total production, Illinois usually ranks fairly well. In normal seasons, Texas, New York, Iowa and Illinois, each produces approximately five per cent of the total honey crop of the United States. (They are exceeded only by California). A fair comparison can scarcely be drawn between Illinois and either Texas or New York, because the conditions of honey flora and climate are so very different. But the conditions in Illinois and Iowa are very similar.

According to the 1920 Census Report, Illinois with 162,630 colonies ranked fifth among the states of the union, in the total number of colonies. But, with a crop of 1,897,000 pounds, she fell to eighth place in total honey production. The average yield was 12 pounds per colony.

In the same year, Iowa with 138,319 colonies, ranked only ninth in the number of colonies, but climbed to fourth place in total production with a crop of 2,840,000 pounds and had an average yield of 20 pounds per colony, or nearly double the average yield in Illinois. To put it another way, Iowa with 25,000 fewer colonies than Illinois, produced nearly a million pounds more honey.

We are well aware that census figures on bees and honey production are far from complete, yet they are probably as complete for one state as another and hence are comparative at least. Some may wonder whether the situation in 1919 was typical for Iowa and Illinois. I am of the opinion that it was fairly typical for both. In support of this opinion I will submit the following evidence based upon figures gathered by the Bureau of Markets and published in Gleanings of Bee Culture.

Only once in the last five years, has Illinois ranked better than twentieth in average yield per colony. Beginning with 1919, her rank in average yield has been, twentieth, thirty-third, twenty-third, sixth and twentieth, respectively. During the same period, Iowa's rank has been eleventh, twelfth, twentieth, fourth and eleventh, respectively.

While the honey resources of this State may not be quite as great as those of Iowa, this difference if there is any, does not appear sufficient to account for the markedly lower average yield in Illinois. The climate here is fully equal to that of Iowa so far as honey production is concerned. But I have heard from a number of reliable sources, that box-hives are numerous in some sections of Illinois. While box-hives are not exactly a novelty in Iowa, they are not very common. It is my belief that the prevalence of box-hives in this State is largely responsible for the low average yields of surplus honey.

As we well know, box-hives are not common where modern methods are in vogue. The value of such methods can best be taught by actual demonstrations carried on in various parts of the State. This type of educational work has been carried on for several years with telling results in Iowa where more than a hundred demonstration apiaries have been established in various parts of the state.

This work is carried out about as follows: A request that the work be carried out in a county must come through the County Farm Bureau. A trip on organization work is made by the Extension Specialist in Beekeeping. This usually is done sometime during the winter. A general beekeepers' meeting is held and modern methods are discussed. The beekeepers then vote for or against the establishment of a demonstration apiary in their county. If the vote is favorable, some beekeeper is found who is willing to cooperate. All the requirements necessary are that the cooperator furnish adequate equipment for five colonies, that he allow the meetings to be held at his place for two years, and during this time, do everything in his power to interest neighboring beekeepers in the project.

The five colonies set aside are to be managed by the Bee Specialist or according to his directions. The beekeeper operates the rest of his colonies according to his usual methods, and at the close of the season results are compared. The Bee Specialist makes five trips to each demonstration yard during the season, each time holding a meeting and demonstration. The results from one hundred demonstration apiaries in 1922 showed that the demonstration colonies produced an average of about 35 per cent more honey than did those operated by the owner.

A clipping taken from a recent issue of "Better Iowa" relates the experience of Lewis Marlow of Boone County, at whose apiary, one of the demonstration yards was located. "During the past season, Mr. Marlow secured 800 pounds of honey from 5 properly handled demonstration colonies and but 115 pounds from 5 check colonies which were given no special care. These latter colonies will need additional feed to tide them over the winter. The average of the demonstration colonies, 160 pounds, exceeded the total of the check colonies. Mr. Marlow is convinced of the superiority of improved methods.

I had expected it would be necessary for me to combat the stale argument that there is already an over-production of honey but I have been relieved of that task by several speakers who have preceeded me. They have shown the falacy of that line of reasoning much more forcefully than I could have done; and they have pointed out the fact that

one of the greatest drawbacks to the establishment of a stable honey market is underproduction.

I am convinced that the beekeepers of Illinois are not content with the present status of their industry. This is indicated by the fact that they are becoming better organized. They are making known their wants in legislature halls and at the University. They are demanding and securing privileges and benefits which have been enjoyed by most branches of agriculture for many years past. The old admonition, "Ask and ye shall receive," is as true today as ever, but the asking often needs to be done by organizations and not by individuals only.

With respect to the apicultural situation as a whole, Illinois is headed in the right direction and when she "hits her stride," other states will have to step lively or be left behind.

HONEY AS A FOOD.

(By K. Hawkins.)

There's a jazz in honey!

Not the kind you get when you dance to the strains of ragtime, or the feeling which used to come over you after a "shot in the arm." It's a good, honest jazz, that makes you want to work, and gives you the "pep" of a recently promoted second lieutenant.

Candy factories are taking the place of distilleries. Many don't know it, but in much of the candy, ice-cream and cookies, they are eating, to satisfy that inexplicable desire, honey is an important ingredient. Why?

Hark back to the scientist and ask him why the human race on the North American continent eats so much sugar. Sugars are the greatest energy producing foods known. North Americans eat lots of energy producing food and consequently are the most "peppy" of all mankind. They even admit it.

To the tired lounge-lizard or the bored society woman seeking a new "jazz," honey offers the answer. "Eat and ye shall be filled"—with "pep." Honey is not only a sugar, it is three sugars. In addition to sucrose, the sugar of the common "garden" or granulated variety, it contains dextrose and levulose, two other valuable food sugars.

Like the cow, the honeybee has two stomachs, one for temporary storage, and one for private use. The honeybee may regurgitate food from the storage stomach, but she goes further and places this regurgitated food in honeycomb.

In the partial process of digestion in this bee storage stomach, the sucrose of the nectar is partly broken up into dextrose and levulose, saving the human stomach this job. This is why honey is valuable as a food to dyspeptics, invalids and those afflicted with kidney trouble, as well as the strong man looking for a kick.

We rediscover many things. In the book of proverbs, you will find "Eat thou honey, because it is good." The honey producer points with pride to his life work—putting the "pep" in the good right arm of Uncle Sam. Where honey fails in this, the bee has the remedy. One guess! Were you ever stung?

HONEY SOLUTION AS AN ANTI-FREEZE FOR RADIATORS.

(By R. H. Kelty, Entomology Dept., M. A. C.)

Honey has been used for making an anti-freeze solution to use in automobile radiators for six or seven years by beekeepers and others in various parts of the country. Although it has been long known by scientists that the addition of sugar to water would depress the freezing point, the use of honey for this purpose has not been practiced until recent years.

Laboratory tests show that the proper dilution of honey will stand the severest temperatures without freezing. The proper dilution to use depends upon how low the temperature drops in a given locality during the winter. Where the temperature seldom drops below zero, a solution made of one-half honey and one-half water by volume should be used. If the temperature occasionally drops to fifteen below zero, the correct proportion is sixty per cent honey and forty per cent water by volume. Where the temperature commonly drops lower than fifteen below zero, a solution of two parts honey to one part of water by volume should be used. In the case of the heavier solutions the addition of one quart of denatured alcohol to three gallons of the solution will appreciably improve the circulation in the radiator.

The proper way to make the solution is as follows: After choosing the formula which will meet the requirements of winter temperature for the district, heat the required amount of water to make up the desired quantity of solution to the boiling point and stir in the correct amount of honey. Continue stirring until the honey is entirely dissolved. Then raise the temperature of the honey solution to the boiling point and allow the solution to boil for from three to five minutes. After the solution has cooled somewhat, skim off the slight amount of scum which has formed and stir in the proper amount of alcohol. It is not necessary to use the alcohol but the amount mentioned improves it. After the solution has cooled to room temperature it is ready to pour in the radiator.

However, before using the honey solution, radiator hose connections should be inspected, and if leaking, should be reshellaced and tightened. If the engine-head gasket leaks, the solution, in passing through, will cause an objectionable stickiness. The level of the solution in the radiator should be at least two inches below the overflow pipe since the solution swells considerably with heat and will over-flow anyway if full.

In use, the water in the honey solution will evaporate out somewhat. However, it is only necessary to add more water to the solution when starting out in the morning. The water will mix thoroughly with the remaining honey solution during the day.

The honey solution can be drained off and used again at will. In fact the solution can be stored during the summer months and used again the following winter if a little alcohol is added to the solution to prevent fermentation during the warm months.

Honey solution is entirely safe as an anti-freeze. Even with a sudden extremely cold change, below the freezing point of the solution, no damage will be done to the engine or engine-head since the organic matter in the solution prevents solid freezing. Instead the solution congeals and forms a sort of a slush which will reliquify between five and ten below zero.

If the solution has slushed, when the engine is started, throw a blanket over the radiator for a few minutes after starting and the solution will immediately become liquid.

The solution has been used with equal success in radiators having no water pump and in radiators having a water pump. When used in radiators having no water pump, the lower eight or ten inches of the radiator should be protected during extremely cold weather.

On account of the high boiling point of honey, the solution will have a boiling point ranging from 215 degrees to 220 degrees, depending on the amount of honey used in the mixture. This is a distinct advantage over the use of alcohol, which has a boiling point of about 180 degrees, since with the honey solution the engine receives better radiation and may get better carburation. But the outstanding advantage of the honey solution as an anti-freeze is the fact that the solution becomes stronger with evaporation instead of weaker and is entirely safe. One can fill his radiator with honey solution and forget it except for the periodical adding of enough water to replace what has evaporated.

Only well-ripened honey should be used. Honey which has fermented or honey-dew honey is unsatisfactory. Actual tests show that honey is about twice as efficient as sugar sirup, glucose, or molasses in deferring the freezing point. The color of the honey does not matter and therefore dark honey of poor quality for eating purposes is as good as any and can be bought for less.

THE NEW METHOD OF STERILIZING COMBS AFFECTED WITH AMERICAN FOULBROOD SO THAT THEY CAN BE USED OVER AGAIN WITH PERFECT SAFETY.

(By E. R. Root.)

Dr. J. C. Hutzelman, of Glendale, Ohio, is the discoverer of a process for sterilizing combs affected by American foulbrood so that these combs for three or four cents each can be safely given back to the bees. As the invention or discovery has now passed the experimental stage I believe its importance to the beekeeping industry is surpassed only by the invention of the movable frame, the honey-extractor, the bee-smoker, and comb foundation. Indeed, it may be doubted if it is not on an even par with them. It will enable the beekeepers of the country to save their valuable combs and at the same time enable them to hold the most serious pest that the beekeeper has to contend with—namely, American foulbrood—under control. I am convinced that, under the old method of treating, cutting out the combs, melting them up, etc., the disease has been spread, even by intelligent beekeepers, and under the very eyes of foulbrood inspectors themselves. The very act of cutting out the combs, cutting into the honey, and then storing them to be melted up later, involves the smearing up of tools, clothing, and other things, in a way that leaves remnants of honey everywhere, to which the bees may later gain access. Unless the containers holding the cut combs are leak-proof infected honey will ooze out, get under the feet, and then be tracked into the apiary. By the new method all that is necessary is to dip the diseased combs, if they contain no honey, into the sterilizing solution for 48 hours, at the end of which time they can be given back to the bees after airing and drying.

This new sterilizing solution contains formalin. The alcohol dissolves the scale, as it is a penetrant—that is to say, it will penetrate all *sealed* as well as unsealed cells of brood, whether diseased or sound. It will dissolve the scale, and even dissolve the wax if the combs are left in too long. The fact that the alcohol is such an active penetrant makes it possible for the germ-destroyer, formalin, probably the best known in the world, to kill the spores as well as the active germs of American foulbrood.

This solution has been tested in such a large way that it is now past the experimental stage. Thousands of diseased combs have been treated by this solution; and, so far as I know, not a single case of American foulbrood has reappeared in these combs when given back to the bees.

The Mode of Treatment.

All combs containing diseased brood, if they contain no honey, can be dipped immediately into the solution. At the end of 48 hours they can be used again after airing. All sealed honey when present in diseased combs should be uncapped. It is advisable to extract this honey or to soak the combs containing it in water for 24 hours. At the end of that time the water should be shaken out, or, better, extracted, when the combs will be ready for treatment.

After treatment the solution should be shaken out, or, better, extracted, and saved, because it can be used over and over again. Unlike some germicides it does not lose its strength nor its power to destroy the germs.

Some extensive experience on our part, as well as that of others, shows that, at the present prices of the solution, the cost of the germicide per comb is less than 2 cents; or the total cost, including the labor, about 3½ cents. The cost of treating combs in a small way will, of course, be greater. The small beekeeper or backlot beekeeper, however, can treat his combs at odd hours at practically no expense for labor.

Cost of the Old Treatment.

The old treatment involved cutting the diseased combs out of the frames, boiling the old frames or buying new ones, melting up the wax, and having it made back again into foundation. This involves an expense, depending upon conditions, of anywhere from 18 to 25 cents per comb. On top of all this a frame of foundation falls far short of old black comb in the midst of a honey-flow, as every good beekeeper knows; and it therefore can be seen that the new treatment will not only save an enormous expense to the beekeepers of the country and of the world, but it brings a new era into the industry by putting it on a surer and safer foundation. The two hazards of beekeeping have been wintering and foulbrood. The first has been almost solved, while the second has reached a stage where a beekeeper can clean up his own territory and bees at comparatively little expense.

Cost of Apparatus.

It is advisable to have a pair of rubber gloves, but these are not essential. One can use a pair of pliers with wide-opening jaws. The ordinary pliers used by automobilists will enable one to pick up the combs without getting his fingers into the solution. In the way of tanks, the ordinary 60-pound cans with the top cut off answer very nicely. About seven combs can be put into a square can at a time. When the combs are in place the solution can be poured in so that over half of all the combs will be submerged. At the end of 48 hours the combs are turned end for end, and soaked 48 hours more.

If one desires to immerse the combs completely, all that is necessary is to lengthen out a square can. The material in any other square can will make it possible for an ordinary tinsmith to lengthen out two

other square cans to more than comb length. In other words, two cans may be made out of three ordinary 60-pound square cans. In these two cans, seven combs to the can can be completely submerged.

If one wishes to do the work in a wholesale way, all that is necessary to do is to increase the number of his square cans. These can usually be had for a few cents. As a rule, the ordinary beekeeper in this country has a big supply of them that have but little or no market value.

MARKETING HONEY—RETAIL AND WHOLESALE.

(By W. A. Hunter.)

Marketing is the act of selling or of purchasing in or as in a market. Webster defines market as "a meeting together of people at a stated time and place for the purpose of traffic by private purchase and sale." Many of us are old enough to recall the old-fashioned market place, which is long since out of date. We can also recall the old dark, unventilated, rat and mouse infested grocery store, with its fly-specked tin scoop, pint, quart and half gallon measure, overrun with ants and insects of various kinds. This sort of a store is also a thing of the past. People are now educated to a more sanitary method of handling food stuffs and business is done upon a higher and more honorable plan. The progressive merchant has it distinctly understood that unsatisfactory goods may be retained in exchange for goods that are satisfactory, or, if preferable to the customer, the goods are to be returned and the money refunded. Never argue with a customer but grant that the customer is always right.

For many reasons I do not like the term marketing as applied to present methods of handling goods. MERCHANDISING is really a more fitting word. Webster defines merchandising "to trade; to carry on commerce". CORRECT MODERN METHODS OF MERCHANDISING employ every known means in appealing to the human senses, not only by extremely artistic advertisements in the leading magazines with a national circulation, and newspapers; but also by impressive displays, convincing demonstrations, progressive up-to-date selling methods, thorough distribution, ordering conveniences, prompt and safe delivery to the consumer and credit inducements.

I would call the reader's attention to several of the leading magazines which have beautifully colored artistic display ads, which cannot be overlooked by even the most casual observer. Successful merchants recognize the fact that the day of haphazard advertising is over; that the advertisement must, in its structural quality, be regarded as a unit of effective art, and that thought in planning and execution must be an integral part of an advertising campaign.

Advertising, wisely utilized, is a great economic power to broaden markets and decrease the cost of distributing goods, but if unscientifically employed, is wasteful to the community. The following rules will give some idea of the care exercised by successful advertisers in their planning:

1. The market analysis or study upon which the advertising program was based.

2. Particular problems met in adapting the advertising to marketing conditions and the methods used to meet these problems.

3. The objectives chosen for the campaign and why these were selected.

4. The choice of the advertising appeals as governed by the analysis of the product and the study of motives controlling possible purchases of the product.

5. The reasons governing the preparation of copy and art treatment adopted.

6. The method of determining the appropriation for the campaign.

7. The considerations governing the choice of media, including media reinforcing the newspaper and periodical advertising.

8. The consideration of factors involved in scheduling the advertising.

In merchandising any commodity the human senses must be appealed to. What are these senses which influence human action? SIGHT, SMELL, HEARING, TASTE AND TOUCH,

Keeping these human senses constantly in mind the honey producer should have no difficulty in selling his crop of good honey at an attractive price. Assuming that the honey is of a good quality, it should be packed under sanitary conditions and offered for sale in a good looking, clear, flint glass container, with an attractive label which should state specifically and truthfully the kind and quality of honey in the container. No salesman can afford to in any way mislead or deceive his customer. Only a fool would think of deception, for all successful business is based upon confidence. Honey must be seen, to sell readily and to the best advantage, regardless of where it is offered for sale.

Many grocers fail to realize the importance of placing their honey where it can be seen by their customers. Articles such as coffee, sugar, flour, etc., need not be conspicuously exhibited, as customers expect always to find them in the grocery and call for them as a matter of fact, but seldom will a housewife go to the grocery for the purpose of purchasing honey, while if honey is seen and makes the proper appeal she will frequently take a jar home.

The human family is largely controlled by habit. The American people have the butter, coffee, tea and sugar habit, but no one seems to have ever been sufficiently interested in developing a human habit for honey consumption. I am reliably informed that honey is always on every hotel dining table at every meal, every day in the year, in Switzerland, the same as you will find butter, bread, salt and pepper on the dining table in America.

Now it is up to the beekeepers to create the honey habit in America, and it can be done if every beekeeper will make it his business to sell only the finest honey for table use. There is a market for the off-grades of honey with the bakers and chewing tobacco manufacturers, but even if there were no market for the low grade honeys it would benefit the beekeeper to destroy the low grade honeys or feed them to the pigs, for it has frequently come to my knowledge that honey customers have been discouraged from purchasing honey after being imposed upon by some beekeeper in selling them low grades of honey.

When you lose your customer's confidence, or when the beekeeping industry loses the confidence of the honey eater the market is affected just to the extent that such confidence is abused and destroyed.

The honey flow in this territory this season was practically a failure, although considerable honey dew was gathered and stored by the bees. Three different customers consulted me this fall to learn where they could secure some good honey. Upon inquiring I found they had all three purchased honey dew for honey, or else honey they purchased was blended with honey dew. Just how many other customers purchased honey dew for honey without going to the trouble to investigate and inform themselves cannot be estimated.

So you can readily see that an ignorant or malicious beekeeper can and does do the honey business inestimable injury by selling low grade honey and honey dew for honey. He not only destroys the confidence of a steady customer for himself but for every other beekeeper who is endeavoring to establish a trade.

Some large commercial honey bottlers have injured the honey market by blending cheap, low grade honey with the delicious high grade honeys, in order to lower their price and undersell the honorable honey bottlers. In time national grading laws will be established and legalized, as has already been done in some states, and when it is compulsory for the honey producer to label or brand his honey with a complete statement of all the facts regarding the quality, grade and source of the honey under the label, then the honey purchaser will be protected and have recourse upon the seller, which will establish confidence and improve the demand and market.

No sensible honey producer should ever sell a consumer anything but the best honey for table use. No sensible honey producer should ever cut the retail price of the large commercial honey bottlers, for when he does he is cutting his own throat, as the commercial honey bottlers in self defense must in turn reduce the price they pay for the honey they buy to bottle. If you wish to favor a customer or friend make them a present of your honey, but never cut the price. Always produce, pack, sell and deliver to the customer only such grades as you know will please him.

Producers rarely ever realize that goods are never sold until they reach the consumer, are found satisfactory and paid for. Perhaps all of you are perfectly familiar with the guaranty of the leading mail-order houses. This really tells the whole story of correct methods of modern merchandising. Under the present high standard of doing business the seller must assume all responsibility for pleasing his customer in every way, or refund the customer's money and take the goods back. The week before Christmas in 1922 one of our leading mail-order houses received remittances daily for over a week in excess of a million dollars per day, which all goes to show that they have the customer's confidence. Unsold honey, over and above current demand, on the grocer's or jobber's shelves, or in warehouses, is simply in the way of future sales and movement. Unused honey in the consumer's pantry simply stops further sale, and for that reason only the most delicious honey should be

sold the consumer, to induce increased consumption and encourage repeat orders.

During the past summer I solicited an order from one of my customers. The lady informed me that she still had some honey which she could not use as it was granulated. I suggested that the honey be reliquified by putting it in warm water. This she had already done but did not leave it long enough or keep the water hot enough to accomplish the purpose, so I immediately called for the granulated honey and gave her liquified honey in exchange, as I knew that the package of granulated honey in her pantry was a barrier to further sale. I am quite sure very few beekeepers realize that their honey sales are frequently stopped by just such circumstances. Always have it distinctly understood that your customers will be conferring a great favor upon you to return any honey that is not perfectly satisfactory to them, regardless of the reason. Insist upon them returning any honey that does not please them, and you will find your sales increasing and your customers consuming more honey than they otherwise would. The following slogan should be on every honey container: "If you do not like this honey return it and get your money."

According to current prices of other comparable food products, a fine grade of honey should retail for not less than 45 cents per pound jar. This applies to either extracted honey, chunk honey, bulk comb or comb honey in sections. Never compare honey with the health-wrecking, death-dealing, man-made sugar, nor permit anyone else to make such a ridiculous comparison, but if you must make a comparison, or your customers insist upon a comparison, call their attention to the following prices:

Pure jellies, per pound	70c
Pure preserves, per pound	45c
Pure jams, per pound	45c
Pure marmalade, per pound	45c
Coffee, per pound	40c
Tea, per pound	90c

The following current quotations are from a leading mail-order house:

Maple syrup, per gallon	$2.96
Cane syrup, maple blend, per gallon	$1.80
Honey, per gallon	$1.92

The beekeepers are undoubtedly to blame for a gallon of honey selling at $1.92 while maple syrup sells for $2.96 a gallon, or $1.04 more for a gallon of maple syrup than a gallon of honey. Bear in mind that maple syrup is a manufactured article, while good honey, undefiled by the hand of man, is the only natural sweet obtainable. It is a well known fact that the maple syrup producers cooperate and sell their honey through a well managed selling organization, which accounts for the difference in price.

At the present time creamery butter is selling for 58 cents per pound; eggs are selling for 60 cents per dozen. Many of you can re-

member when good country butter sold for 15 cents and 20 cents a pound and eggs sold for 10 cents and 15 cents a dozen, peddled and delivered from house to house by the farmer, wife or daughter, but the butter and egg people have recognized and taken advantage of modern methods of merchandising, while the unprogressive beekeeper still markets his honey in the antiquated hand-to-hand primitive way, receiving little or no pay for his time and energy spent, and until the beekeeper or honey producer adopts modern methods the honey market will be no better than it is now.

Correct modern methods of merchandising incorporate everything from the beginning of production to the final step in delivering a satisfactory article to a pleased customer; that is to say, the latest and most modern means must be employed in the production, preparation, distribution and disposition of honey before the results will be satisfactory to the honey producer, for it is plain to see that honey produced, prepared, distributed and disposed of as it is today cannot compete with other food products handled by modern merchandising methods. The beekeeper who produces a fine grade of honey, prepares it for market under sanitary conditions, and offers it for sale in an attractive container, under an artistic label with a truthful statement of the quality, grade and source, using all of the already thoroughly established channels of distribution and the latest scientific principles of disposition, need have no worry about the future of his honey market.

A retail price must be established and maintained which will enable the producer to permit the grocer to make his customary percentage of profit, and also be able to allow the jobber his usual discount, otherwise the beekeeper cannot expect them to become interested in marketing honey. They are in business for the same reason that you are, and when you establish your retail price never cut it under any circumstances, for the moment you do you lose the confidence of not only the jobber and the grocer but also the confidence of the consumer, for if the customer thinks that there is a chance to purchase honey at a lower price he will simply wait and may never buy. Bear in mind that jobbers are never interested in any brand of goods until a demand has been created for that particular brand, nor is the grocer interested in any brand of goods until his customers call for it repeatedly and persistently. It is up to the producer to create a demand from the consumer for his particular brand of honey.

So do not get the impression that by stocking the grocer or the jobber your work is done. As a matter of fact your responsibility has just started. It is the producer's business to see that the honey moves from the grocer to the consumer and from the jobber to the grocer. Successful merchandising is a constant study and there can be no let-up or rest for the producer who expects to make a success of marketing his crop. Always remember that the producers of comparable food products never let up but are constantly at work, making an irresistable appeal for the consumer's dollar, and beekeepers must do the same or the honey market will remain in its present deplorable condition.

THE FITNESS OF A LIBRARY AS A MEMORIAL TO DR. C. C. MILLER.

(By B. F. Kindig.)

Many of you knew Dr. Miller personally and intimately for many years. While I have coveted the honor, the privilege and the pleasure that you have experienced, yet I have known him only as the millions of others have known him through his writings. From these I feel that I have quite an intimate acquaintance with him. Sometimes I feel that when we are privileged to know through the written page, the inner moods, the deep feelings and the high purposes of such a one as Dr. Miller, perhaps we may know him nearly as well as those do who went down the years shoulder to shoulder with him. It is thus I have known him as America's greatest beekeeping authority—a student, a scholar and a great teacher.

The things that Dr. Miller did characterized him as a student—the efforts he put forth to secure an education, his interest in the fine arts and his mastery of the sciences, his writing of books and his contributions to the various journals—all these were done for the love of culture and of learning and his knowledge and observations were passed on to others because of his desire to serve his fellow men. In his autobiography, Dr. Miller tells us of his teaching—tutoring in college, the teaching of music and his public school teaching. I think of Dr. Miller as predestined to be a teacher. To me that one quality stands out preeminent. He was doubtless a master in teaching and was a source of inspiration to the many who sat before him. How infinitely greater has been the number whom he has inspired and taught through his books and the pages of the journals to which he contributed!

The wealth of knowledge which Dr. Miller left as the inheritance of this and coming generations was given, I believe, that each one might receive a spiritual blessing through the gain that might accrue as a result of his observations and discoveries. I do not believe he ever coveted anything but spiritual wealth but he well knew that a greater measure of spiritual growth might follow in the path of financial independence. And thus he always kept in mind the economic aspects of his profession. A student of his writings may learn not only to keep bees but to live life well and thus fulfill the great purpose of our Creator.

I look upon a library as the permanent record of the achievements and experiences of the race. In the sixty years from the time that Dr. Miller came into possession of that first swarm of bees in the sugar barrel, to the end of his beekeeping career, he passed through probably every worth while experience in beekeeping that anyone ever has had. As would be expected of a great student and teacher, he carefully noted

the behavior of the bees and thus became an authority. What he saw and learned was soon passed on to others who did not have the natural gifts for seeing and understanding that he had.

The beekeepers of the world want his influence and his teachings to go on to the end of time. It is universally agreed that this could best be accomplished only through a library composed of his writings and the writings of every other eminent authority in the world. A library is a silent teacher. Dr. Miller himself is silent today but his voice through his writings rings to the ends of the earth. We would have it continue so. The multitudes of students who will spend a time in the library of the great institution where it is located, will read those pages not as from one who has gone, but as a contemporary message from a fellow student. Truth is eternal and the words of wisdom in Dr. Miller's messages are more enduring than granite or bronze. Long after the tablet which we dedicate today has passed from its present resting place, those truths which he taught will be as inspiring to the student of that day as they have been during his life time. We believe that Dr. Miller would have his influence for good perpetuated. We believe that he would have the inspiration which he gave to the multitudes continue to benefit mankind after he is gone. In the establishing of this library, we are making in his name and founding upon his works an eternal contribution to the betterment of mankind. We are building today to Dr. Miller, our friend, our adviser and our fellow beekeeper, to Dr. Miller, the student, the scholar and the teacher, a monument more enduring, more honorable, more majestic and more in harmony with his life and ideals than anything that could be fashioned from bronze or marble.

FORMATION OF THE ILLINOIS STATE BEEKEEPERS' ASSOCIATION.

SPRINGFIELD, ILL., *February 26, 1891.*

The Capitol Beekeepers' Association was called to order by President P. J. England.

Previous notice having been given that an effort would be made to form a State association, and there being present beekeepers from different parts of the State, by motion, a recess was taken in order to form such an association.

P. J. England was chosen temporary chairman and C. E. Yocum temporary secretary. On motion, the Chair appointed Thos. G. Newman, C. P. Dadant and Hon. J. M. Hambaugh, a Committee on Constitution.

Col. Chas. F. Mills addressed the meeting on the needs of a State association and stated that it was his opinion that the beekeepers should have a liberal appropriation for a State Apiarian Exhibit at the World's Columbian Exposition.

A motion to adjourn till 1:30 p. m. prevailed.

AFTERNOON SESSION.

The Committee on Constitution reported a form for same which, on motion, was read by the Secretary, by sections serially.

Geo. F. Robbins moved to substitute the word "shall" for "may" in the last clause of Section 1, Article III. This led to a very animated discussion, and the motion was lost.

J. A. Stone moved to amend the above-named section by striking out the word "ladies" and all that followed of the same section, which motion led to further discussion, and motion finally prevailed.

Section 2, Article II, relating to a quorum, was, on motion, entirely stricken out.

Mr. Robbins moved to amend Article V by adding the words "Thirty days' notice having been given to each member." Prevailed.

Thos. G. Newman moved to adopt the Constitution, so amended, as a whole. Which motion prevailed.

(See Constitution).

J. A. Stone moved that the Chair appoint a Nominating Committee of three on permanent organization. Prevailed.

Chair appointed as such committee, Col. Chas. F. Mills, Hon. J. M. Hambaugh, and C. P. Dadant.

Committee retired and in a few minutes returned, submitting the following named persons as candidates for their respective offices:

For President—P. J. England, Fancy Prairie.

For Vice Presidetns—Mrs. L. Harrison, Peoria; C. P. Dadant, Hamilton; W. T. F. Petty, Pittsfield; Hon. J. M. Hambaugh, Spring; Dr. C. C. Miller, Marengo.

Secretary—Jas. A. Stone, Bradfordton.

Treasurer—A. N. Draper, Upper Alton.

Mr. Black moved the adoption of the report of the Committee on Nominations. The motion prevailed, and the officers as named by the committee were declared elected for the ensuing year.

Hon. J. M. Hambaugh moved that Mr. Thos. G. Newman, Editor American Bee Journal, of Chicago, be made the first honorary member of the association. Prevailed.

At this point, Col. Chas. F. Mills said:

Mr. Chairman, "I want to be the first one to pay my dollar for membership," at the same time suiting his action to his words, and others followed his example, as follows:

CHARTER MEMBERS.

Col. Chas. F. Mills, Springfield.
Hon. J. M. Hambaugh, Spring.
Hon. J. S. Lyman, Farmingdale.
C. P. Dadant, Hamilton.
Chas. Dadant, Hamilton.
A. N. Draper, Upper Alton.
S. N. Black, Clayton.
Aaron Coppin, Wenona.
Geo. F. Robbins, Mechanicsburg.
J. W. Yocum, Williamsville.
Thos. S. Wallace, Clayton.
A. J. England, Fancy Prairie.
P. J. England, Fancy Prairie.
C. E. Yocum, Sherman.
Jas. A. Stone, Bradfordton.

FIRST HONORARY MEMBER.

Thos. G. Newman, Editor American Bee Journal, Chicago.

STATE OF ILLINOIS—DEPARTMENT OF STATE.

ISAAC N. PEARSON, *Secretary of State.*

To All to Whom These Presents Shall Come—GREETING:

WHEREAS, A certificate duly signed and acknowledged having been filed in the office of the Secretary of State on the 27th day of February, A. D. 1891, for the organization of the Illinois State Beekeepers' Association, under and in accordance with the provisions of "An Act Concerning Corporations," approved April 18, 1872, and in force July 1, 1872, and all acts amendatory thereof, a copy of which certificate is hereunto attached.

NOW THEREFORE, I, Isaac N. Pearson, Secretary of State, of the State of Illinois, by virtue of the powers and duties vested in me by law, do hereby certify that the said, The Illinois State Beekeepers' Association, is a legally organized corporation under the laws of the State.

IN TESTIMONY WHEREOF, I hereunto set my hand and cause to be affixed the great seal of State.

Done at the city of Springfield, this 27th day of February, in the year of our Lord one thousand eight hundred and ninety-one, and the Independence of the United States the one hundred and fifteenth.

[SEAL] I. N. PEARSON, *Secretary of State.*

STATE OF ILLINOIS, } ss.
County of Sangamon, }

To Isaac N. Pearson, Secretary of State:

We, the undersigned, Perry J. England, Jas. A. Stone and Albert N. Draper, citizens of the United States, propose to form a corporation under an act of the General Assembly of the State of Illinois, entitled, "An Act Concerning Corporations," approved April 18, 1872, and all acts amendatory thereof; and for the purposes of such organizations, we hereby state as follows, to-wit:

1. The name of such corporation is, The Illinois State Beekeepers' Association.

2. The object for which it is formed is to promote the general interests of the pursuit of bee-culture.

3. The management of the aforesaid Association shall be vested in a board of three Directors, who are to be elected annually.

4. The following persons are hereby selected as the Directors, to control and manage said corporation for the first year of its corporate existence, viz: Perry J. England, Jas. A. Stone, and Albert N. Draper.

5. The location is in Springfield, in the county of Sangamon, State of Illinois.

(Signed) PERRY J. ENGLAND,
JAS. A. STONE,
ALBERT N. DRAPER.

STATE OF ILLINOIS, } ss.
Sangamon County, }

I, S. Mendenhall, a notary public in and for the county and State aforesaid, do hereby certify that on this 26th day of February, A. D. 1891, personally appeared before me, Perry J. England, James A. Stone and Albert N. Draper, to me personally known to be the same persons who executed the foregoing certificate, and severally acknowledged that they had executed the same for the purposes therein set forth.

In witness whereof, I have hereunto set my hand and seal the day and year above written.

[SEAL] S. MENDENHALL, *Notary Public.*

CONSTITUTION AND BY-LAWS OF THE ILLINOIS STATE BEEKEEPERS' ASSOCIATION.

Constitution.

Adopted Feb. 26, 1891.

ARTICLE I.—NAME.

This organization shall be known as The Illinois State Beekeepers' Association, and its principal place of business shall be at Springfield, Ill.

ARTICLE II.—OBJECT.

Its object shall be to promote the general interests of the pursuit of bee-culture.

ARTICLE III.—MEMBERSHIP.

Section 1. Any person interested in apiculture may become a member upon the payment to the Secretary of an annual fee of one dollar and fifty cents ($1.50). (Amendment adopted at annual meeting, December, 1919): And any affiliating association, as a body, may become members on the payment of an aggregate fee of fifty cents (50c) per member, as amended November, 1910.

Sec. 2. Any person may become honorary member by receiving a majority vote at any regular meeting.

ARTICLE IV.—OFFICERS.

Section 1. The officers of this association shall be, President, Vice President, Secretary and Treasurer. Their terms of office shall be for one year, or until their successors are elected and qualified.

Sec. 2. The President, Secretary and Treasurer shall constitute the Executive Committee.

Sec. 3. Vacancies in office—by death, resignation and otherwise—shall be filled by the Executive Committee until the next annual meeting.

ARTICLE V.—AMENDMENTS.

This Constitution shall be amended at any annual meeting by a two-thirds vote of all the members present—thirty days' notice having been given to each member of the association.

By-Laws.

ARTICLE I.

The officers of the association shall be elected by ballot and by a majority vote.

ARTICLE II.

It shall be the duty of the President to call and preserve order at all meetings of this association; to call for all reports of officers and committees; to put to vote all motions regularly seconded; to count the vote at all elections, and declare the results; to decide upon all questions of order, and to deliver an address at each annual meeting.

ARTICLE III.

The Vice Presidents shall be numbered, respectively, First, Second, Third, Fourth and Fifth, and it shall be the duty of one of them, in his respective order, to preside in the absence of the President.

ARTICLE IV.

Section 1. It shall be the duty of the Secretary to report all proceedings of the association, and to record the same, when approved, in the Secretary's book; to conduct all correspondence of the association, and to file and preserve all papers belonging to the same; to receive the annual dues and pay them over to the Treasurer, taking his receipt for the same; to take and record the name and address of every member of the association; to cause the Constitution and By-laws to be printed in appropriate form and in such quantities as may be directed by the Executive Committee from time to time, and see that each member is provided with a copy thereof; to make out and publish annually, as far as practicable, statistical table showing the number of colonies owned in the spring and fall, and the amount of honey and wax produced by each member, together with such other information as may be deemed important, or be directed by the Executive Committee; and to give notice of all meetings of the association in the leading papers of the State, and in the bee journals at least four weeks prior to the time of such meeting.

Sec. 2. The Secretary shall be allowed a reasonable compensation for his services, and to appoint an assistant Secretary if deemed necessary.

ARTICLE V.

It shall be the duty of the Treasurer to take charge of all funds of the association, and to pay them out upon the order of the Executive Committee, taking a receipt for the same; and to render a report of all receipts and expenditures at each annual meeting.

ARTICLE VI.

It shall be the duty of the Executive Committee to select subjects for discussion and appoint members to deliver addresses or read essays, and to transact all interim business.

ARTICLE VII.

The meeting of the association shall be, as far as practicable, governed by the following order of business:

Call to order.
Reading minutes of last meeting.
President's address.
Secretary's report.
Treasurer's report.
Reports of committees.
Unfinished business.
Reception of members and collection.
Miscellaneous business.
Election and installation of officers.
Discussion.
Adjournment.

ARTICLE VIII.

These By-Laws may be amended by a two-thirds vote of all the members present at any annual meeting.

C. E. YOCOM.
AARON COPPIN.
GEO. F. ROBBINS.

Following is a copy of the law passed by the Illinois Legislature May 19, and signed by the Governor June 7, 1911, to take effect July 1, 1911:

STATE FOUL BROOD LAW.

State Inspector of Apiaries.

Preamble.
§ 1. State Inspector of Apiaries—appointment — term — assistants —per diem.
§ 2. Foul Brood, etc. — what declared nuisances—inspection—notice to owner or occupant—treatment—abatement of nuisance—appeal.
§ 3. Annual Report.
§ 4. Penalties.

House Bill No. 670.

(Approved June 7, 1911.)

AN ACT *to prevent the introduction and spread in Illinois of foul brood among bees, providing for the appointment of a State Inspector of Apiaries and prescribing his powers and duties.*

Whereas, the disease known as foul brood exists to a very considerable extent in various portions of this State, which, if left to itself, will soon exterminate the honey bees; and

Whereas, the work done by an individual beekeeper or by a State inspector is useless so long as the official is not given authority to inspect and, if need be, to destroy the disease when found; and

Whereas, there is a great loss to the beekeepers and fruit growers of the State each year by the devasting ravages of foul brood;

Section 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That the Governor shall appoint a State Inspector of Apiaries, who shall hold his office for the term of two years, and until his successor is appointed and qualified, and who may appoint one or more assistants, as needed, to carry on the inspection under his supervision. The Inspector of Apiaries shall receive for each day actually and necessarily spent in the performance of his duties the sum of four dollars to be paid upon bills of particulars certified to as correct by the said State Inspector of Apiaries, and approved by the Governor.

Sec. 2. It shall be the duty of every person maintaining or keeping any colony or colonies of bees to keep the same free from the disease known as foul brood and from every contagious and infectious disease among bees. All beehives, beefixtures or appurtenances where foul brood or other contagious or infectious disease among bees exists, are hereby declared to be nuisances to be abated as hereinafter prescribed. If the inspector of apiaries shall have reason to believe that any apiary is infected by foul brood or other contagious disease, he shall have power to inspect, or cause to be inspected, from time to time, such apiary, and for the purpose of such inspection he, or his assistants, are authorized during reasonable business hours to enter into or upon any farm or premises, or other building or place used for the purpose of propagating or nurturing bees. If said inspector of apiaries, or his assistants, shall find by inspection that any person, firm or corporation

is maintaining a nuisance as described in this section, he shall notify in writing the owner or occupant of the premises containing the nuisance so disclosed of the fact that such nuisance exists. He shall include in such notice a statement of the conditions constituting such nuisance, and order that the same be abated within a specified time and a direction, written or printed, pointing out the methods which shall be taken to abate the same. Such notice and order may be served personally or by depositing the same in the potsoffice properly stamped, addressed to the owner or occupant of the land or premises upon which such nuisance exists, and the direction for treatment may consist of a printed circular, bulletin or report of the Inspector of Apiaries, or an extract from same.

If the person so notified shall refuse or fail to abate said nuisance in the manner and in the time prescribed in said notice, the Inspector of Apiaries may cause such nuisance to be abated, and he shall certify to the owner or person in charge of the premises the cost of the abatement and if not paid to him within sixty days thereafter the same may be recovered, together with the costs of action, before any court in the State having competent jurisdiction.

In case notice and order served as aforesaid shall direct that any bees, hives, beefixtures or appurtenances shall be destroyed and the owner of such bees, hives, beefixtures or appurtenances shall consider himself aggrieved by said order, he shall have the privilege of appealing within three days of the receipt of the notice to the County Court of the county in which such property is situated. The appeal shall be made in like manner as appeals are taken to the County Court from judgments of justices of the peace. Written notice of said appeal served by mail upon the Inspector of Apiaries shall operate to stay all proceedings until the decision of the County Court, which may, after investigating the matter, reverse, modify or affirm the order of the Inspector of Apiaries. Such decision shall then become the order of the Inspector of Apiaries, who shall serve the same as hereinbefore set forth and shall fix a time within which such decision must be carried out.

Sec. 3. The Inspector of Apiaries shall, on or before the second Monday in December of each calendar year, make a report to the Governor and also to the Illinois State Beekeepers' Association, stating the number of apiaries visited, the number of those diseased and treated, the number of colonies of bees destroyed and the expense incurred in the performance of his duties.

Sec. 4. Any owner of a diseased apiary or appliances taken therefrom, who shall sell, barter or give away any such apiary, appliance, queens or bees from such apiary, expose other bees to the danger of contracting such disease, or refuse to allow the Inspector of Apiaries to inspect such apiary, or appliances, shall be fined not less than $50 nor more than $100.

Approved June 7, 1911.

(Bill passed in the Fiftieth General Assembly.)

BEEKEEPERS' ASSOCIATION.

THE ORIGINAL BILL.

§ 1. Appropriates $1,000 per annum—proviso.

§ 2. How drawn.

§ 3. Annual Report.

AN ACT *making an appropriation for the Illinois State Beekeepers' Association.*

Whereas, The members of the Illinois State Beekeepers' Association have for years given much time and labor without compensation in the endeavor to promote the interests of the beekeepers of the State; and,

Whereas, The importance of the industry to the farmers and fruit-growers of the State warrants the expenditure of a reasonable sum for the holding of annual meetings, the publication of reports and papers containing practical information concerning beekeeping, therefore, to sustain the same and enable this organization to defray the expenses of annual meetings, publishing reports, suppressing foul brood among bees in the State, and promote the industry in Illinois;

Section 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That there be and is hereby appropriated for the use of the Illinois State Beekeepers' Association the sum of one thousand dollars ($1,000) per annum for the year 1917, 1918, for the purpose of advancing the growth and developing the interests of the beekeepers of Illinois, said sum to be expended under the direction of the Illinois State Beekeepers' Association for the purpose of paying the expenses of holding annual meetings, publishing the proceedings of said meetings suppressing foul brood among bees in Illinois, etc.

Provided, however, That no officer or officers of the Illinois State Beekeepers' Association shall be entitled to receive any money compensation whatever for any services rendered for the same, out of this fund.

Sec. 2. That on the order of the President, countersigned by the Secretary of the Illinois State Beekeepers' Association, and approved by the Governor, the Auditor of Public Accounts shall draw his warrant on the Treasurer of the State of Illinois in favor of the treasury of the Illinois State Beekeepers' Association for the sum herein appropriated.

Sec. 3. It shall be the duty of the Treasurer of the Illinois State Beekeepers' Association to pay out of said appropriation, on itemized and receipted vouchers, such sums as may be authorized by vote of said organization on the order of the President countersigned by the Secretary, and make annual report to the Governor of all such expenditures, as provided by law.

Itemized in the Omnibus Bill as follows:

For shorthand reporting	$200.00
For postage and stationery	50.00
For printing	550.00
Expense of meetings	200.00
Total amount of the appropriation	$1,000.00

The Assembly ruled that this is not to be paid in *lump* but drawn on itemized accounts.

NOTE: The amount now appropriated is $1,200.00.

CODE OF RULES AND STANDARDS FOR GRADING APIARIAN EXHIBITS AT FAIRS AS ADOPTED BY ILLINOIS STATE BEEKEEPERS' ASSOCIATION.

COMB HONEY.

Rule 1. Comb honey shall be marked on a scale of 100, as follows:

Quantity	40	Style of display	20
Quality	40		

Rule 2. Points of quality should be:

Variety	5	Straightness of comb	5
Clearness of capping	10	Uniformity	5
Completeness of capping	5	Style of section	5
Completeness of filling	5		

Remarks: By variety is meant different kinds, with regard to the sources from which the honey is gathered, which adds much interest to an exhibit.

2. By clearness of capping is meant freedom from travel stain and a water soaked appearance. This point is marked a little high, because it is a most important one. There is no better test of the quality of comb honey than the appearance of the cappings. If honey is taken off at the proper time, and cared for as it should be, so as to preserve its original clear color, body and flavor will take care of themselves, for excellence in the last two points always accompanies excellence in the first. Clover and basswood honey should be white; heartsease, a dull white tinged with yellow; and Spanish needle, a bright yellow.

3. By uniformity is meant closeness of resemblance in the sections composing the exhibit.

4. By style is meant neatness of the sections, freedom from propolis, etc.

5. Honey so arranged as to show every section should score the highest in style of display, and everything that may add to the tastiness and attractiveness of an exhibit should be considered.

EXTRACTED HONEY.

Rule 1. Extracted honey should be marked on a scale of 100, as follows:

Quantity	40	Style and display	15
Quality	45		

Rule 2. Points of quality should be:

Variety	10	Style of package	10
Clearness and color	5	Variety of package	5
Body	5	Finish	5
Flavor	5		

Remarks: 1. Light clover honey pouring out of a vessel is a very light straw color; Spanish needle, a golden hue, and dark clover honey, a dull amber.

2. Style of package is rated a little high, not only because in that consists the principal beauty of an exhibit of extracted honey, but also because it involves the best package for marketing. We want to show honey in the best shape for the retail trade, and that, in this case, means the most

attractive style for exhibition. Glass packages should be given the preference over tin; flint glass over green, and smaller vessels over larger, provided the latter run over one or two pounds.

3. By variety of package is meant chiefly different sizes; but small pails for retailing, and, in addition, cans or kegs (not too large) for wholesaling, may be considered. In the former case, pails painted in assorted colors, and lettered "Pure Honey," should be given the preference.

4. By finish is meant capping, labeling, etc.

5. Less depends upon the manner of arranging an exhibit of extracted than of comb honey, and for that reason, as well as to give a higher number of points to style of package, a smaller scale is allowed for style of display.

SAMPLES OF COMB AND EXTRACTED HONEY.

Rule 1. Single cases of comb honey, entered as such for separate premiums, should be judged by substantially the same rules as those given for a display of comb honey, and samples of extracted, by those governing displays of extracted honey.

Rule 2. Samples of comb or extracted honey, as above, may be considered as part of the general display in their respective departments.

GRANULATED HONEY.

Rule 1. Candied or granulated honey should be judged by the rules for extracted honey, except as below.

Rule 2. Points of quality should be:

Variety	10	Style of package	10
Fineness of grain	5	Variety of package	5
Color	5	Finish	5
Flavor	5		

Rule 3. An exhibit of granulated honey may be entered or considered as part of a display of extracted honey.

NUCLEI OF BEES.

Rule. Bees in observation hives should be marked on a scale of 100, as follows:

Color and markings	30	Quietness	5
Size of bees	30	Style of comb	5
Brood	10	Style of hive	10
Queen	10		

Remarks: 1. Bees should be exhibited only in the form of single frame nuclei, in hives or cages with glass sides.

2. Italian bees should show three or more bands, ranging from leather color to golden or light yellow.

3. The markings of other races should be those claimed for those races in their purity.

4. A nucleus from which the queen is omitted should score zero on that point.

5. The largest quantity of brood in all stages or nearest to that should score the highest in that respect.

6. The straightest, smoothest and most complete comb, with the most honey consistent with the most brood, should score the highest in that respect.

7. That hive which is neatest and best made and shows the bees, etc., to the best advantage should score the highest.

QUEEN BEES.

Rule: Queen bees in cages should be marked on a scale of 100, as follows:

Quantity ..... 40 Quality and variety..... 40
Style of caging and display..... 20

Remarks: 1. The best in quality consistent with variety should score the highest. A preponderance of Italian queens should overweigh a preponderance of black ones, or, perhaps, of any other race or strain; but sample queens of any or all varieties should be duly considered. Under the head of quality should also be considered the attendant bees. There should be about a dozen with each queen.

2. Neatness and finish of cages should receive due consideration, but the principal points in style are to make and arrange the cages so as to show the inmates to the best advantage.

BEESWAX.

Rule. Beeswax should be marked on a scale of 100, as follows:

Quantity ..... 40 Quality 40
Style of display..... 20

Remarks: 1. Pale, clear, yellow specimens should score the highest, and the darker grades should come next in order.

2. By style is meant chiefly the forms in which the wax is molded and put up for exhibition. Thin cakes or small pieces are more desirable in the retail trade than larger ones. Some attention may be given to novelty and variety.

FOUL BROOD IN BEES.

So important it is to be well posted on the two most important, and likewise, most destructive, disease of bees, that a full description of the disease and their treatment is herewith given. These are taken verbatim from Bulletins Nos. 2 and 5 of the Michigan Apiary Inspection Division and were written by Michigan's present State Bee Inspector, Mr. B. F. Kindig.

AMERICAN FOULBROOD.

American Foulbrood is an infectious disease of the larvae of the honey bee.

CAUSE.

The disease is caused by a microscopic organism similar in appearance and habits to some of the germs which cause disease in the human body. The organism is known as *Bacillus larvae.*

SYMPTOMS.

To the beekeeper who is unfamiliar with this disease, usually the first symptoms apparent are a gradual weakening of the colony and the presence of a very unpleasant odor in the hive. In the very early stages of the disease it is recognized by an occasional brood cell capping being sunken and darker in appearance than the cappings of the adjacent cells. A part of these cappings may also have small holes in them, often ragged in appearance. Upon further examination it may be found that in a few uncapped cells the larvae have died and are decaying on the lower cell walls. Upon careful examination, the dead larval remains in all of the cells just mentioned will be found to be similar in shape and position, although they may vary somewhat in color. Soon after the death of the larva it begins to take on a brownish appearance and the longer the larva has been dead and the more it becomes dried down the darker is the color. When the remains have dried down to a thin scale on the lower cell wall the color becomes almost black. When larvae die from this disease the decayed remains tend to become quite gluey in their consistency. If a match or tooth-pick be inserted into the cell and a part of the remains drawn out it will be found to stretch out somewhat like glue. This quality is commonly spoken of as ropiness and is often considered the diagnostic symptom of this disease. However, in making a diagnosis these four factors should be present:

(1) The larvae should lie on the lower cell wall.

(2) The color should be brown or black.

(3) The consistency of the larvae should be ropy unless dried down into a black hard scale.

(4) The odor should be repulsive, inasmuch as it is commonly described as smelling like a glue pot.

Even in a very mild case of disease the first three symptoms should be apparent while the fourth (the odor) may not be so noticeable if only a few cells are affected. Whenever there is the slightest doubt as to the diagnosis of disease a sample of the comb containing the diseased larvae

should be sent to the U. S. Department of Agriculture, Bee Culture Laboratory, Washington, D. C., where a microscopic examination will be made. Upon application, the department will gladly furnish a mailing case for sending in samples of comb for disease identification.

TREATMENT.

The only successful treatment for American Foulbrood consists in removing the bees from the combs and hives and placing them in a clean hive without combs but in which the frames are fitted with full sheets of foundation. There are slight variations in the method of treatment according to the season of the year. These slight differences will be fully discussed under the method of treatment for the particular season. If it is at all possible to avoid it, a diseased colony should never be treated in the same yard with colonies that are not diseased. Wherever possible, the diseased colonies should be removed a mile or more from the yard, given the proper treatment and then returned to the yard. Whenever treating for disease one should give due consideration to the location of other beekeepers in order that disease may not be spread by robbing during the process of treatment.

SPRINGTIME TREATMENT.

When it is desired to treat the bees in the spring as early as possible and when more than one colony is diseased, it is possible to save the brood of each colony excepting the last one treated by the following plan:

Pick out from among the diseased colonies the ones which are deemed strong enough to stand the shock of treatment during the month of May. Each of these colonies should be transferred into clean hives with full sheets of foundation and the brood which they had should be placed on one or more of the weaker diseased colonies. In the process of transferring, the diseased colony is placed two feet or so to the back or side of where it formerly stood. The hive into which it is desired to transfer the bees is placed on the old stand. After placing a newspaper in front of the hives to catch any honey that may drip, then taking one frame at a time the bees should be brushed upon the paper in front of the new hive. Care should be used to see that the queen enters the new hive. After she is in, a queen-guard or queen and drone trap should be placed on the entrance to prevent the swarm from absconding. After all the bees have been removed, the combs may be placed on another diseased colony as said before. If only one colony is affected then the combs should be buried deeply or burned. In all of the manipulations concerned with the handling of disease every precaution must be used in order that no robbing may take place. If any robbing occurs it is quite certain that each colony concerned in the robbing will later become diseased. For this reason it is customary to treat diseased bees late in the evening after the bees quit flying. If it is necessary to treat them in a yard where there are healthy colonies, then the entrances to all the adjacent healthy colonies should be closed with a screen so that in the excitement and confusion incident to transferring if any of the bees from the diseased hive attempt to enter they will be unable to do so. If it is impractical to remove the bees from the yard for treatment, then the hives should be moved a foot or more each day until the diseased hives are as far as they can be placed in the yard from other colonies. Many beekeepers who have treated disease from year to year find it advisable to use a screened cage about six feet square and six feet high. They perform all of the work of transferring within this cage. In this way it is impossible for robbers to enter or for any of the bees of the colony to enter another hive. Whenever bees are disturbed as in transferring they fill their honey sacs with honey. In case it is a diseased colony the honey which they carry may transmit disease to any colony which such bees may enter. It

is, therefore, very essential that all of the bees of a diseased colony be kept together. Colonies which are strong enough to admit of treatment in the month of May should build up and store a satisfactory amount of honey during the following honey flow.

SUMMER TREATMENT.

Weak colonies on which the brood was stacked from the colonies treated in May, or other colonies which were too weak for treatment at that time should be treated during the first few days of the main summer honey flow which in this State is either the basswood or clover flow. The same method of treatment should be followed as described previously, excepting that in case some colonies are not strong enough at that time to produce surplus honey, then, two or more colonies should be united at the time of treatment. It is not advisable to handle colonies in such a way that the surplus honey crop is entirely sacrificed. If an increase in the number of colonies is desired, it can be made in the latter part of the clover flow with but very slight sacrifice in the honey crop. The brood from five or six treated colonies can be piled upon one diseased colony and after three weeks when all of the brood is hatched, then the remaining colony should be treated. Whether or not all of the colonies are to be treated at the beginning of the main honey flow is optional with the beekeeper. If they are all treated at that time all frames containing brood must be burned or buried at once. If some of the diseased colonies are still weak it is probably best to pile the brood from those that are strong enough on them and arrange to treat three weeks later. However, when treatment is delayed until three weeks after the beginning of the honey flow in some instances not sufficient time is left for them to store honey enough for their needs. In this case they will have to be fed later.

FALL TREATMENT.

It occasionally happens that a colony which becomes infected in the spring may not be discovered until after the clover honey crop has been gathered. In general, it is not advisable to treat bees when there is no honey flow. The danger of robbing under such conditions is very much greater and feeding must be resorted to in order to keep the colony alive. Late cases of infection may be treated during the month of October after brood rearing has practically ceased. The method of treatment is the same as described before, excepting that the bees are transferred into a hive without frames. They should be left in this hive for at least 48 hours. At that time the beekeeper should carefully remove the hive body from the bottom board. A hive body full of combs of honey taken from a healthy colony should be set in its place. Then the empty hive body with the bees should be set on top and jarred slightly. The bees will then take possession of the combs and honey and the empty hive body may be removed.

FEEDING IN CONNECTION WITH TREATMENT.

When it is desirable to treat very early in the season it is occasionally necessary to resort to feeding in order to get the foundation drawn out and to get brood rearing under way as quickly as possible. Realizing that the bees carry with them a supply of honey which is sufficient for their food for several days, it is not necessary to do any feeding until two to three days after treatment. It is very fortunate that in the digesting of the disease carrying honey which the bees have in their honey sacs at the time of treatment, all danger of disease is eliminated. When bees are placed on foundation they very rapidly use up the honey which they have with them in the secretion of wax for comb building. For this reason it is not advisable in treating disease to give the colony a set of drawn combs. When this is done

they deposit the honey which they carry with them in the cells and part of it is fed to the young larvae which they proceed to rear. Thus the disease which was present in the old hive is continued in the new one. When it is necessary to feed, the use of a Boardman entrance feeder or an Alexander bottom board is very convenient. If these are not at hand a very efficient feeder can be made by punching a number of fine holes in the lid of a friction top pail. This should be filled with syrup and inverted directly over the frames. The bees will then suck out the syrup.

DISPOSAL OF WAX AND HONEY.

Where only a small number of colonies are treated the best means of disposal of the frames and honey is to burn or bury them. In cases where a large yard is quite generally diseased it then becomes advisable to save as much of the equipment as possible. After the brood has been allowed to emerge as previously mentioned, then the hive bodies of combs should be removed to a bee-tight building. There the honey should be extracted at once. The honey may be used for making honey vinegar. It is not desirable to sell this honey as it may be exposed by the purchasers in such a way that bees may secure some of it and thus carry the disease to their own hives.

After extracting, unless a very cold cellar is available for storing the combs, it is necessary to cut the combs out and melt them at once because of the danger of wax moths at that season. No one should ever attempt to ship diseased combs to a foundation factory for rendering, excepting during the months of December, January and February. When combs are packed in a barrel and shipped, very often honey leaks out upon the floors of the cars or in the freight houses and becomes accessible to the bees of the vicinity. This practice is forbidden by law in most states including Michigan.

After disposing of the combs and honey the frames should be boiled for not less than five minutes in a solution made from one can of concentrated lye to six gallons of water. Before placing the frames in this solution the wax and propolis should be carefully removed. After boiling, the frames should be thoroughly rinsed in a tub of clear, warm water. The hive bodies, super covers and bottom boards, should be thoroughly scraped to remove all particles of wax, honey and propolis. Then they should be gone over with a flame of a blow torch and the surface scorched until no germs can remain alive. Ordinarily supers and hive bodies are more easily sterilized by piling them up-side-down as high as one can conveniently reach and burning a small handful of straw or paper on the inside. Care must be exercised else the whole pile of supers will be burned up. A hive cover should be convenient for putting over the top to top the blaze.

It must be realized that there is grave danger in the handling of diseased material unless every precaution is taken to prevent robbing. The extractor should be thoroughly scalded out after extracting diseased honey. If possible the extractor should be taken to where it may be turned up-side-down and a steam hose turned into it with considerable pressure for at least 15 minutes. If the wax is rendered, the slumgum and the water used in wax rendering should be buried after the bees have quit flying in the evening. All vessels or tools which come in contact with the disease must be thoroughly disinfected. If the above directions are followed carefully much valuable material may be saved. If not, Foulbrood will be scattered far and wide over the adjacent territory.

METHODS OF SPREAD.

American Foulbrood is commonly spread through carelessness on the part of someone. If carelessness on the part of beekeepers could be eliminated the problem of controlling Foulbrood would be very much simpli-

fied. Weak diseased colonies may be robbed out because the entrances have not been contracted to a point where they can defend themselves. Dead diseased colonies are robbed out because the beekeeper's carelessly leaves such colonies exposed in the bee-yard. It is a beekeeper's business to know whether any colonies are dead or weak, and it is his business to take care of them so that they may not be a menace to the neighboring beekeepers. The careless exposure of disease carrying honey and the like is criminal and the offender should be punished by nothing less than confinement in the county jail. Often honey houses and other places where diseased honey and combs are stored have cracks in the doors or windows or the siding does not fit properly and whatever is contained therein is exposed to all of the bees in the territory. Often hives in which the colonies have died from disease are sold either through ignorance of the seller, or as has been amply demonstrated, because his sense of right and justice has never been properly developed. A careful survey of conditions in Wisconsin showed that a large part of the spread of foulbrood was directly traceable to the selling or moving of diseased hives or equipment. The feeding of honey, a part of which was extracted from a diseased colony, causes an outbreak of disease wherever such honey is fed. It is not always possible to know whether or not some of it may have come from a diseased hive even though no disease is known to be present in the bee-yard. Some of the honey in the yard may have been stored from honey robbed from a diseased colony in the neighborhood.

BEE YARD SANITATION.

The bee-yard practice must be such as to prevent robbing.

Frames of honey should not be taken from one colony and given as food to another colony.

A diseased colony should never be opened when there is the slightest danger of robbing.

Diseased colonies should be removed from the yard as soon as discovered and treated before returning them.

Carelessness, ignorance and malice are at the bottom of most of the spread of disease.

Do not use equipment from an unknown source without seeing to it that it can not carry disease.

When a colony shows disease every frame connected with that colony must be destroyed. Some have erroneously judged that those frames which do not have dead larvae in them are suitable for further use.

In purchasing bees buy them in combless packages, not on drawn combs, unless there has been no disease among the bees for at least one year. The selling of diseased bees contributed largely to the spread of disease in Illinois.

Every super and every frame should be numbered to correspond with the hive on which it belongs and should be used there and nowhere else. If this suggestion is followed, extracted honey producers will find that foulbrood is just as easy to control in their yards as in the yards of comb honey producers.

EUROPEAN FOUL BROOD.

European Foul Brood is a bacterial disease which causes the death of the larvae of workers, queens and drones. It attacks them normally when they are about three days old and usually kills them before the cells are capped. The disease is quite variable in its severity; in some cases most of the uncapped larvae are affected while in other colonies or under different conditions of season or honey flow, but very mew larvae may be attacked.

DISTRIBUTION.

European Foul Brood is found in nearly all sections of the country, and in Illinois is prevalent in Central and Northern Illinois. Several years ago Dr. E. F. Phillips of the Bureau of Entomology, United States Depart-

ment of Agriculture, called the attention of the writer to what seemed to be a striking coincidence, in that European Foul Brood seemed to be particularly virulent on the poorer types of soil. The truth of this statement seems to be well borne out in the distribution of the disease in the various counties. While the disease is frequently met with on the heavier types of soil, yet it appears as a serious menace largely on the lighter soils where there is but little incoming nectar during the spring and early summer months. There are many counties in the State from which the disease has not been reported. This should not be construed to mean that such territories are immune from the malady. On the contrary, it seems to be purely an accident that this trouble has not appeared in many of these counties.

PREDISPOSING CONDITIONS.

As noted above, areas in which there are but few nectar secreting flowers during the early part of the season seemed to be favorable for the development of the disease. As Italian bees are essential for the control of this disease, it therefore follows that in those communities where the black bees predominate European Foul Brood is particularly serious. It has also been noted that the poor wintering of bees is exceedingly favorable to rapid progress of the disease. Those colonies are particularly susceptible which are weak in numbers and slow to build up either because of insufficient strength or because of the presence of a failing queen.

STRENGTH OF COLONY IN RELATION TO DISEASE.

Strong colonies of bees attempt to eradicate the disease from the hive by carrying out the dead larvae. This reminds one of the reaction of a strong colony to the presence of wax moths. Weak colonies seem to make but little effort to clean out the diseased larvae as they appear. The carrying out of the dead larvae seems to be an important factor in retarding the spread of he disease within the colony. Nurse bees have often been observed sucking the juices from the bodies of the dead larvae. Doubtless the nurse bees, because of their contamination with the bacteria, form the principal agency in the dissemination in the hive.

Very little is definitely known regarding the spread of the disease from hive to hive or from one apiary to another. It has been definitely shown, however, that the disease can be transferred by the agency of the honey taken from the diseased colonies.

DIAGNOSIS.

The larvae are first affected by European Foul Brood while they are curled up in the backs of the cells adjacent to the midrib of the comb. Frequently the larvae seem to move slightly before death and dead larvae change in color from pearly white to gray or yellow and if permitted to remain in the cells they may become a yellowish brown or brown in color. The larvae do not adhere tightly to the cell walls. In serious cases there is usually a decided odor. There is but slight ropiness, if any at all. Queen, worker, and drone larvae seem to be equally susceptible to the disease.

In case of any doubt in diagnosis of disease, write to the Bee Culture Laboratory, Department of Agriculture, Washington, D. C., asking for a box in which to mail a sample of the diseased comb. The comb should not be wrapped in waxed paper nor mailed in tin containers.

TREATMENT.

During the past ten years the methods of treatment for European Foul Brood have been changed quite radically. The transferring of the bees from the diseased hive is no longer advocated.

E. W. Alexander of New York and Dr. C. C. Miller of Illinois, demonstrated conclusively that the destruction of combs and the loss of brood were unnecessary in treating this disease. Dr. E. F. Phillips has summed up the whole matter of preventive measures: "The practices of good beekeeping are those which result in the eradication of European Foul Brood."*

Every beekeeper should look forward to the possibility of European Foul Brood becoming epidemic in his apiary. Preventive measures are therefore indicated rather than awaiting the coming of the disease and then attempting to remedy the situation. The following points are particularly important in this connection. Young queens, an abundance of food, suitable winter protection, Italian blood, and strong colonies.

In combating the disease after it has appeared, the queens of the diseased colonies should be killed and Italian queens of known resistance should be introduced as soon as the bees have had an opportunity to free the combs from all dead larvae. The length of time required for removing the dead larvae depends upon the race of bees and strength of the colonies as well as the amount of infection present. If colonies are weak, it is frequently desirable to unite two or more colonies. The uniting of two weak discouraged diseased colonies frequently results in a complete change of morale and a quick cleaning up of the diseased material.

In those apiaries where most colonies are headed with resistant stock, it is unnecessary to send away for queens. Ripe queen cells from the best queens may be introduced into the colonies at the time the old queens are killed or a few days later depending upon the severity of the disease. If the cells are introduced some time after the removal of the queens, then a careful examination of the combs must be made and all queen cells removed before introducing the ripe cells. Negligence in this matter may result in a hopelessly queenless colony due to the destruction by the bees of the cell introduced and by the blasting of the cells reared by the colony because of the disease present.

In connection with the treatment for disease, beekeepers frequently find it advantageous to feed a thin syrup at frequent intervals. After requeening all diseased colonies the beekeeper should keep very close watch of the performance of the various queens. He should begin rearing young queens from those queens which seem to produce colonies most resistant to the disease. The beekeeper should not depend entirely upon purchasing queens from regular queen breeders. He should learn to rear his own queens from those which he knows are fully capable of carrying their colonies through the season without a severe outbreak of disease. The vigor of a queen seems to be impaired by shipping through the mail. Vigor is of exceeding importance in queens in apiaries where disease is present.

* Farmers' Bulletin 975, "The Control of European Foul Brood," by Dr. E. F. Phillips.

LIST OF MEMBERS OF THE ILLINOIS STATE BEEKEEPERS' ASSOCIATION FOR 1923.

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